EXHIBIT G

PTO/SB/08A (07-05)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	10/806,775
Filing Date	03/22/2004
First Named Inventor	Lawrence G. Hopkins
Art Unit	3745
Examiner Name	Ninh H. Nguyen
Attorney Docket Number	HTR007-1P US (new)

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	US- 4,494,006	01-15-1985	Staroselsky et al.	
	2	US- 5,269,660	12-14-1993	Pradelle	
	3	US- 4,158,527	06-19-1979	Burkett	
	4	US- 3,332,621	07-25-1967	Tanner	
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

PTO/SB/08B (07-05)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 2 of 2

Complete if Known	
Application Number	10/806,775
Filing Date	03/22/2004
First Named Inventor	Lawrence G. Hopkins
Art Unit	3745
Examiner Name	Ninh H. Nguyen
Attorney Docket Number	HTR007-1P US (new)

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	5	AAON worksheet and drawing regarding Borders East Towers job for customer Borders Group, dated 02/26/2001 and 02/06/2001 (2 pages)	
	6	AAON order form, estimating worksheet, and facsimile transmission regarding The Commons job, dated 09/15/1998, 09/30/1998 and 06/30/1998 (3 pages)	
	7	AAON wiring diagram assignment and verification regarding Farm Show Arena job, 04/01/2002 (1 page)	
	8	AAON worksheet and drawing regarding Harrison Hills job, both dated 02/26/2002 (2 pages)	
	9	AAON RL Feature Master Number sheet, dated 10/17/2001 (1 page)	
	10	Mammouth Selection Guide for Custom Penthouse (200-410 Tons Cooling-only VAV configurations, 1992 (14 pages)	

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

EXHIBIT H

RL FEATURE MASTER--FEATURE NUMBER
UPDATED 10/17/01

1st FEATURE--RETURN/OUTSIDE AIR OPTIONS			
A FEATURE--OUTSIDE AIR SECTION	B FEATURE--R/A BLOWER CONFIG.	C FEATURE--R/A BLOWER	D FEATURE--R/A MOTOR
0=Std - Manual Outside Air	0=Std (No return or exhaust blower)	0=Std (No return or exhaust blower)	0=Std (No return or exhaust blower)
A=Economizer	A=1 Blower (Standard efficiency motor)	A=Blower A (36" Dia 6 Blade)	A=.75 hp (1170 rpm)
0=Power Exhaust	B=2 Blowers (Standard efficiency motor)	B=Blower B (42" Dia 8 Blade)	B=1.0 hp (1170 rpm)
C=Power Return	C=1 Blower (Premium efficiency motor)	C=Blower C (42" Dia 12 Blade)	C=2.0 hp (1170 rpm)
D=Heat Wheel Small (T) (one 74 inch wheel)	D=2 Blowers (Premium efficiency motor)	D=Blower D (48" Dia 16 Blade)	D=3.0 hp (1170 rpm)
E=Heat Wheel Medium (T) (one 81 inch wheel)	E=Option C w/ VFD		E=5.0 hp (1170 rpm)
F=Heat Wheel Large (T) (two 74 inch wheels)	F=Option D w/ two motors on one VFD		F=7.5 hp (1170 rpm)
G=Heat Wheel Extra Large (T)(two 81 inch wheels)[2]	G=Option D w/ two motors on two VFD's		G=10 hp (1170 rpm)
H=Heat Wheel Small (S) (one 74 inch wheel)[1]			H=15 hp (1170 rpm)
J=Heat Wheel Medium (S) (one 81 inch wheel)[1]			J=20 hp (1170 rpm)
K=Heat Wheel Large (S) (two 74 inch wheels)[1]			K=25 hp (1170 rpm)
L=Heat Wheel Extra Large (S)(two 81 inch wheels)[1,2]			L=30 hp (1170 rpm)
M=100% Outside Air (Non-Motorized-No R/A)			M=40 hp (1170 rpm)
N=Motorized O/A--2 Position (0-50%)			N=50 hp (1170 rpm)
P=Motorized O/A--2 Position (0-100%) No R/A			P=60 hp (1170 rpm)
			Q=.75 hp (1760 rpm)
			R=1.0 hp (1760 rpm)
Notes:			S=2.0 hp (1760 rpm)
[1] Contact Factory for SPA on Sensible Heat Wheels			T=3.0 hp (1760 rpm)
[2] D and E Cabinet Only			U=5.0 hp (1760 rpm)
			V=7.5 hp (1760 rpm)
			W=10 hp (1760 rpm)
			Y=15 hp (1760 rpm)
			Z=20.0 hp (1760 rpm)
			1=25.0 hp (1760 rpm)
			2=30.0 hp (1760 rpm)
			3=40.0 hp (1760 rpm)
			4=50.0 hp (1760 rpm)
			5=60.0 hp (1760 rpm)

2nd FEATURE--O/A CONTROL	3rd FEATURE--DISCHARGE LOCATIONS	4th FEATURE--RETURN LOCATIONS
0=Std (No Actuator)	0=Bottom Discharge	0=Bottom Return
A=Pos Econ w/ Sensible Limit	A=Front Discharge	A=End Return (no arc or pwr ex)
B=3 Pos. Econ w/ Enthalpy Limit	B=Back Discharge	B=Front Return High CFM (no arc or pwr ex)
C=Full Mod Econ w/ Sensible Limit	C=Top Discharge	C=Front Return Low CFM (no arc or pwr ex)
D=Full Mod Econ w/ Enthalpy Limit	D=End Discharge--Airhandler with Ventilator Section	D=Back Return High CFM (no arc or pwr ex)
E=DDC Econ Control		E=Back Return Low CFM (no arc or pwr ex)
F=Constant Volume Outside Air		F=Front Return High CFM (w/ arc or pwr ex)
G=Option F + Option A		G=Front Return Low CFM (w/ arc or pwr ex)
H=Option F + Option B		H=Back Return High CFM (w/ arc or pwr ex)
J=Option F + Option C		J=Back Return Low CFM (w/ arc or pwr ex)
K=Option F + Option D		
L=Option F+ Option E		
M=CO_2 Override + Option A		
N=CO_2 Override + Option B		
P=CO_2 Override + Option C		
Q=CO_2 Override + Option D		
R=CO_2 Override + Option E		

5th FEATURE--SUPPLY AIR OPTIONS		
A FEATURE--S/A BLOWER CONFIG.	B FEATURE--S/A BLOWER	C FEATURE--S/A MOTOR
0=1 Blower w/(Standard efficiency motor)	A=Blower A (27" Diameter)	A=.75 hp (1170 rpm)
A=2 Blowers w/(Standard efficiency motors)	B=Blower B (30" Diameter)	B=1.0 hp (1170 rpm)
B=3 Blowers w/(Standard efficiency motors)	C=Blower C (33" Diameter)	C=2.0 hp (1170 rpm)
C=4 Blowers w/(Standard efficiency motors)	D=Blower D (36.5" Diameter)	D=3.0 hp (1170 rpm)
D=1 Blower w/(Premium efficiency motors)	E=Blower E (42.5" Diameter)	E=5.0 hp (1170 rpm)
E=2 Blowers w/(Premium efficiency motors)		F=7.5 hp (1170 rpm)
F=3 Blowers w/(Premium efficiency motors)		G=10 hp (1170 rpm)
G=4 Blowers w/(Premium efficiency motors)		H=15 hp (1170 rpm)
H=1 Blower w/(Prem eff mtr) w/VFD		J=20 hp (1170 rpm)
J=2 Blowers w/(Prem eff mtr) w/1 VFD		K=25 hp (1170 rpm)
K=2 Blowers w/(Prem eff mtr) w/2 VFD's		L=30 hp (1170 rpm)
L=3 Blowers w/(Prem eff mtr) w/1 VFD		M=40 hp (1170 rpm)
M=3 Blowers w/(Prem eff mtr) w/3 VFD's		N=50 hp (1170 rpm)
N=4 Blowers w/(Prem eff mtr) w/1 VFD		P=60 hp (1170 rpm)
P=4 Blowers w/(Prem eff mtr) w/2 constant speed and 2 VFD's		Q=.75 hp (1760 rpm)
Q=4 Blowers w/(Prem eff mtr) w/4 VFD's		R=1.0 hp (1760 rpm)
R=4 Blowers w/(Prem eff mtr) w/2 VFDs		S=2.0 hp (1760 rpm)
		T=3.0 hp (1760 rpm)
		U=5.0 hp (1760 rpm)
		V=7.5 hp (1760 rpm)
		W=10 hp (1760 rpm)
		Y=15 hp (1760 rpm)
		Z=20.0 hp (1760 rpm)
		1=25.0 hp (1760 rpm)
		2=30.0 hp (1760 rpm)
		3=40.0 hp (1760 rpm)
		4=50.0 hp (1760 rpm)
		5=60.0 hp (1760 rpm)

6th FEATURE--FILTER OPTIONS		
A FEATURE--PRE FILTER TYPE	B FEATURE--FINAL FILTER TYPE	C FEATURE--FILTER OPTIONS
0=2" Pleated	0=Std	0=Std
A=4" Pleated	A=12" Cartridge 85% Eff--Filter Box A	A=CF-S Pre Filter
B=2" Permanent Frame	B=12" Cartridge 85% Eff--Filter Box B	B=CF-S Final Filter
C=2" Pre/12" Cartridge 85% Eff. [1]	C=12" Cartridge 85% Eff--Filter Box C	C=Magnehelic Gauge Pre Filter
D=2" Pre/12" Cartridge 85% Eff. [1]	D=12" Cartridge 95% Eff--Filter Box A	D=Magnehelic Gauge Final Filter
E=2" Pre/12" Cartridge 85% Eff. [1]	E=12" Cartridge 85% Eff--Filter Box B	E=Option A + B
F=4" Pre/12" Cartridge 85% Eff. [1]	F=12" Cartridge 85% Eff--Filter Box C	F=Option A + C
G=4" Pre/12" Cartridge 85% Eff. [1]	G=30" Bag 85% Eff--Filter Box A	G=Option A + D
H=4" Pre/12" Cartridge 85% Eff. [1]	H=30" Bag 85% Eff--Filter Box B	H=Option B + C
J=2" Pre/30" Bag 85% Eff. [1]	J=30" Bag 85% Eff--Filter Box C	J=Option B + D
K=2" Pre/30" Bag 95% Eff. [1]	K=30" Bag 95% Eff--Filter Box A	K=Option A + B + C
L=4" Pre/30" Bag 85% Eff. [1]	L=30" Bag 95% Eff--Filter Box B	L=Option A + B + D
M=4" Pre/30" Bag 85% Eff. [1]	M=30" Bag 85% Eff--Filter Box C	M=Option A + C + D
Notes:	N=Pre Filter Box A (HI-E Filters)--No Final Filter	N=Option B + C + D
[1] Requires Feature 6B option N, P, or Q to be selected	P=Pre Filter Box B (HI-E Filters)--No Final Filter	P=Option A + B + C + D
	Q=Pre Filter Box C (HI-E Filters)--No Final Filter	

7th FEATURE--REFRIG. CONTROL
0=Std
A=5 MTDR On & 3 MTDR Off
B=20 STDR
C=115V Outlet Field Wired
D=115V Outlet Factory Wired
E=Option A + Option B
F=Option A + Option C
G=Option A + Option D
H=Option A + Option B + Option C
J=Option A + Option B + Option D
K=Option B + Option C
L=Option B + Option D

8th FEATURE--REFRIG. OPTIONS
0=Std
A=Hot Gas Bypass Lead Stage (HGB)
B=Hot Gas Reheat Coil (HGRC)
C=Modulating Hot Gas Reheat Coil (MHGR)
D=HGB Lead + HGB Lag
E=HGB Lead + HGRC
F=HGB Lead + MHGR
G=HGB Lead + HGB Lag + HGRC
H=HGB Lead + HGB Lag + MHGR

9th FEATURE--REFRIG ACCESSORIES
0=Std
A=Sight Glass
B=Compressor Isolation Valves
C=A + B

10th FEATURE--POWER OPTIONS
0=Std Power Block
A=Power Switch (225 amps)
B=Power Switch (400 amps)
C=Power Switch (600 amps)
D=Power Switch (800 amps)
E=Power Switch (1,200 amps)

11th FEATURE--SAFETY OPTIONS
0=Std
A=R/A & S/A Firestat
B=R/A Smoke Detector
C=S/A Smoke Detector
D=R/A & S/A Smoke Detector
E=R/A & S/A Firestat + R/A SD
F=R/A & S/A Firestat + S/A SD
G=R/A & S/A FS + R/A & S/A SD

12th FEATURE--CONTROLS
0=Std
A=Low Limit Controls
B=Phase & Brown Out Protection
C=LLC + Phase & Brown Out Protection

13th FEATURE--SPECIAL CONTROLS
0=Std
A=W973 Honeywell Controller
B=W7100 Honeywell Controller
C=W7100 Controller + Expansion Board
D=VAV Unit Controller
E=Constant Volume Unit Controller
Y=Make Up Air Unit Controller
G=Heat Coil Changeover Controller
H=Field Installed DDC Controls by Others
J=Factory Installed DDC Controls by Others

14th FEATURE--PREHEAT OPTIONS	
A FEATURE--CONFIGURATION	B FEATURE--SIZING
0=Std (No Preheat)	0=Std (No Preheat)
A=Hot Water Coil Preheat (Rend option box) [1]	A=Heat Qty A
B=Steam Distributing Coil Preheat (Rend option box) [1]	B=Heat Qty B
C=Hot Water Coil Preheat O/A	C=Heat Qty C
D=Steam Distributing Coil Preheat O/A	D=Heat Qty D
E=Direct Fired Heat 100% O/A	
Notes:	
[1] Requires an option box from Feature 15	

15th FEATURE--OPTION BOXES
0=Std
A=2ft Box Position 1
B=2ft Box Position 2
C=2ft Box Position 3
D=2ft Box Position 4
E=4ft Box Position 1
F=4ft Box Position 2
G=4ft Box Position 3
H=4ft Box Position 4
J=6ft Box Position 1
K=6ft Box Position 2
L=6ft Box Position 3
M=6ft Box Position 4
N=8ft Box Position 1
P=8ft Box Position 2
Q=8ft Box Position 3
R=8ft Box Position 4

16th FEATURE--CABINET OPTIONS
0=Std
A=Stainless Steel Drain Pans
B=Marine Service Lights
C=Base Insulation
D=Option A + B
E=Option A + C
F=Option B + C
G=Option A + B + C

17th FEATURE--CABINET OPTIONS
0=Std
A=Access door windows
B=Burglar Bars
C=Perf Liner S/A Plenum
D=Perf Liner R/A Plenum
E=R/A Plenum Sound Trap
F=Option A + B
G=Option A + C
H=Option A + D
J=Option A + E
K=Option B + C
L=Option B + D
M=Option B + E
N=Option C + D
P=Option C + E
Q=Option A + B + C
R=Option A + B + D
S=Option A + B + E
T=Option A + C + D
U=Option A + C + E
V=Option B + C + D
W=Option B + C + E
Y=Option A + B + C + D
Z=Option A + B + C + E

18th FEATURE--CUSTOMER CODE
0=ETL U.S.A. Listing
A=ETL U.S.A. + Canada Listing
B=No ETL

19th FEATURE--CODE OPTIONS
0=Std
A=Int. E.A. (New York)
B=Chicago--Coal & Gas
C=Chicago--Coal & Electric Heat
D=Chicago--Coal Only
E=Chicago--Gas Only
F=Chicago--Electric Heat Only
G=Chicago--No Coal No Heat

20th FEATURE--UNIT CONFIGURATION
0=Std (One Piece Unit)
A=Two Piece Unit (Split After Evap Coil)

21st FEATURE--EVAP & WATER CONDENSER
0=Std (No Evap or Water Condenser)
A=Basic Package (Evap Cond or Water Cooled)
B=Low Ambient Package (Evap Cond)
C=Balancing Valves (Water Cond)
D=Single Point Water Connection (Water Cond)
E=Insulated Service Vestibule (Water Cond & Electric Heater)
F=Motorized Shut-off Valve (Water Cond)
G=Head Pressure Control (Water Cond)
H=Option C + D
J=Option C + E
K=Option C + F
L=Option C + G
M=Option D + E
N=Option D + F
P=Option D + G
Q=Option E + F
R=Option E + G
S=Option F + G
T=Option C + D + E
U=Option C + D + F
V=Option C + D + G
W=Option D + E + F
Y=Option D + E + G
Z=Option E + F + G
1=Option C + D + E + F
2=Option C + D + E + G
3=Option C + D + F + G
4=Option C + E + F + G
5=Option C + D + E + F + G

22nd FEATURE--BLANK
0=Std

23rd FEATURE--TYPE
0=Std (Includes "Gray Paint")
1=Special Price Authorization & Special Paint
2=Special Price Authorization & Gray Paint

NOT AVAILABLE WITH INITIAL RELEASE

EXHIBIT I

DECLARATION OF LAWRENCE G. HOPKINS
March 15, 2005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT APPLICATION EXAMINING OPERATIONS

Applicant:	Hopkins	Group Art Unit:	3745
Serial No.:	10/806,775	Examiner:	Nguyen, Ninh H.
Filed:	March 22, 2004	Docket No:	Hunt:FanArr1
Title:	Fan Array Fan Section in Air-Handling Systems		

DECLARATION OF LAWRENCE G. HOPKINS
UNDER 37 CFR SEC. 1.132

Law Office of Karen Dana Oster, LLC
PMB 1020
15450 SW Boones Ferry Rd. #9
Lake Oswego, OR 97035
March 15, 2005

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, Lawrence G. Hopkins, hereby declare as follows:

1. I am an engineer specializing in the fields of fan design, acoustics, vibration, and aerodynamics with particular emphasis in commercial and industrial air handler and ventilation equipment. I received a Bachelors of Science degree in mechanical engineering from The University of Portland in 1975 and became a registered engineer in the State of Oregon in 1982. I have 30 years experience in the fields of acoustics and vibration and 19 years experience in fan and air handling system design. I have worked in the industry in various capacities over the years ranging from engineer to engineering director for three multinational corporations. I directed the construction of two AMCA (Air Movement and Control Association) test facilities each designed and dedicated to the measurement and quantification of fan performance in the areas of air flow rate, consumed power, pressure, efficiency, vibration, sound, and

structural integrity. I am a member of the Institute of Environmental Engineers, Acoustical Society of America and the American Society of Heating Ventilation Engineers.

2. In 2002, I conceived initial embodiments of the present Fan Array Fan Section in Air-Handling Systems invention as a means of providing a fan system with features and benefits far exceeding present technology. The unique array and controller have also had substantially improved results over prior art devices (such as the AAON device) that would have been unexpected to one skilled in the art. The fan array outperforms current technology by a) demonstrating lower energy consumption for a given air delivery requirement, b) increasing system efficiency under steady and diversified loads, c) increasing system reliability to n+1 or greater redundancy, and d) significantly lowering noise levels.

a) The fan array outperforms traditional systems by allowing air entering or leaving the fan section to do so in a laminar manner thus eliminating stratification on upstream and downstream elements. Upstream and downstream elements may include filters, cooling and heating coils, sound attenuators, and humidification racks. Laminar air flow not only improves the efficiency of the individual devices but reduces pressure drop which reduces fan load and consumed power. In many traditional systems, settling means are installed between the inlet and discharge of the fan and surrounding elements to emulate laminar air flow. The settling means adds pressure drop to the system and causes power consumption to increase for a given air delivery requirement.

b) A fan array lowers energy consumption by allowing the designer to tailor the fan system output to the actual operating point of the process. It is general practice that all fan systems are designed for a worst case scenario. The worst case scenario is based on the greatest demand period which is a combination of coldest or warmest day of the year and loading parameters for filters and coils. It also includes safety factors applied to the design by the design engineer. The result is that nearly every air handler manufactured specified, manufactured, and put into service is over-designed for the normal operating condition. The excess design factors can be as high as 30% to 40% resulting in air handling systems that run at reduced efficiency. Fans

and motors are most efficient at one load point at a given speed. Motors are most efficient when nearly fully loaded. The fan wall allows the operator to turn off fans when they are not needed thus maintaining optimal motor efficiency and lower power consumption.

c) Unlike traditional air handler systems that require a complete shutdown to repair a motor failure, the fan array of the present invention is designed to operate and maintain system air with one or more motors off and to allow replacement of the damaged motor without turning the air handler off. This "hot repair" feature is unique to the fan array of the present invention and has proven to be exceedingly valuable to institutions or processes requiring stable delivery of conditioned air. Such industries include hospitals, semiconductor manufacturing plants, and pharmaceutical plants. A failure in the air handling system in process critical systems can result in loss of process control and reduced yield. A fan failure in a critical care facility may require evacuation or rescheduling of facility usage such as would occur for surgery units or areas mandating air delivery as a condition of occupancy. For highly critical spaces it is general practice to install two complete air handlers or install two complete fan systems in order to create what is known as n+1 redundancy. This is not the case with the fan array technology since any member of the fan array can repaired without disruption to the fan system as a whole. This provides 100% assurance that the system will remain stable and not affect critical functions.

d) Fan systems generate higher sound levels when operating at other than peak efficiency. Since the efficiency of the fan array of the present invention can be optimized for a larger range of operating points, the array will produce significantly lower sound levels than traditional systems. This coupled with close fitting insulation elements enables the fan array to outperform traditional systems by as much as 16 dB in the 63, 125, and 250 Hz octave bands. Equivalent reductions in traditional systems would necessitate the use of 7 to 10 foot long sound attenuators each causing a system pressure load and higher power consumption. In many cases the fan array can operate without the need for additional sound attenuation or corresponding pressure requirement.

3. Between my conception and March 20, 2003 (my priority filing date), I was actively involved in testing and development of the product including developing various embodiments thereof. The claimed invention was not patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the priority date.

4. I have reviewed the references submitted concurrently herewith in my INFORMATION DISCLOSURE STATEMENT. These references will be discussed jointly as the "AAON references." The AAON references disclose a fan system (AAON RL Series air handlers) having up to four fans. For the AAON RL Series air handlers, AAON allows the customer/designer to select from 1 to 4 supply fans ranging in size from 27" to 42.5" in diameter and return fans from 36" to 48" in diameter. AAON offers five unit sizes with pre-designed cabinet dimensions. The fan section length for any size or capacity offered is set at a predetermined length regardless of number of fans or fan size. Dimensional drawings included in the AAON application manual show the airway length for the fan section to be a minimum of 75.5" long to 90" long depending on the model.

5. As compared to the AAON RL Series air handlers, the fan array of my invention is based on using a larger quantity of smaller fans to compress the airway length and reduce overall unit size. The AAON application literature and accompanying software prohibit the customer/designer from selecting smaller fans for the purpose of compressing airway length. Because the AAON references teach against the use of smaller fans, it would not be obvious to one skilled in the art to attempt to scale the fan array for the purpose of saving cabinet length and corresponding real estate within the occupied building.

6. The AAON references do not teach or suggest my claimed use of "six fan units." The AAON references disclose the use of one fan unit, two fan units, three fan units, or four fan units (including a 2x2 array of fan units). Nowhere in the AAON references is there any teaching or suggestion that more fan units are contemplated and I have no knowledge of the use of more than the four fan units by anyone in the industry until after my priority date.

7. It is also clear that AAON did not recognize any benefit to increasing the number of fans to six or greater for the purpose of fine tuning the output or achieving higher efficiencies or creating redundancy or incorporating sound attenuating elements. In the AAON design, if one fan motor fails the air flow rate is reduced a minimum of 25%. In the example AAON job provided there are four supply fans each fitted with 25 horsepower motors (19.98 HP required at the operating point) operating at 1580 RPM producing 52,000 cfm. If one fan is turned off or fails, the new maximum flow rate for the unit is determined by speeding the remaining motors up to the maximum motor horsepower. The new maximum flow rate is 47,073 cfm at 1679 rpm at the maximum available power of 25 brake horsepower. Further, the AAON manual forces the user to pick motors based on fan size and duty that will not allow the system to maintain or recover air flow in the event of a motor failure. The AAON system static efficiency at full flow with four fans operating is 67.32% whereas a nine fan array can be configured to run at 72.4% static efficiency using 10 HP motors. Further the nine fan array can be configured to operate with eight fans while maintaining 52,000 cfm at the required pressure of 6.57" tsp while consuming 9.3 brake horsepower at 72.2% static efficiency. Even though one fan is off, the remaining eight fan array will maintain design flow rates while an AAON system with one fan off cannot maintain design flow rates (they actually drop in flow as they overload the motors). It is particularly interesting to note that Cleanpak, along with many other Huntair competitors, went on record criticizing my fan array as something "that would not work." Various publications emerged that contained language raising doubt as to the viability of a fan array. These publications would be available upon request.

8. The AAON references do not teach or suggest my claimed "array controller" for controlling the fan units "to run at substantially peak efficiency by strategically turning selective ones of said at least nine fan units on and off." The AAON references use an array controller that is limited to operating four fans over a limited range. The size of fans available and limited resolution in terms of each fan contribution prohibit the AAON system from functioning in a manner to capture the benefits of the claimed invention. Changes to the AAON array controller scheme or number of fans will

not achieve the same benefits as the claimed fan array. Therefore it would not be obvious to attempt a modification to the controller or fan design to achieve peak efficiency, nor would it be obvious to expect the fan array in the AAON design to function to maintain set flow rates in the event of a fan motor failure or to be able to achieve peak efficiency at with fewer fans.

9. The unique array and controller have solved an unsolved need of a fan system that can be optimized over a wide variety of conditions while offering unprecedented reliability and ease of maintenance. The fan array, by virtue of a reduced airway length, enables building owners to decrease the size of the equipment mechanical room and achieve more usable space or not over build mechanical space to accommodate large air handling systems. The fan array, because of its smaller size, saves on nonrenewable resources such as steel, insulation materials, and energy.

10. In large part because of my unique array and controller, Huntair (the assignee of the present application) has had significant commercial success as is shown in the accompanying power point presentation (Appendix A) and attached specification sheets taken from recent projects (Appendices B-D). The three specification sheets show three projects (out of many) that specify the Huntair fan array as the only allowed fan system. The three referenced projects include; The Sacramento LDS Temple in California (Appendix B), the Faribault Middle School in Minnesota (Appendix C), and the Phoenix Symphony Hall Renovation Project in Arizona (Appendix D). Each of these specifications explicit specify the Huntair Fan Wall Array as the only acceptable fan system for the project. More examples of sole sourcing the fan array are available on request. A further example of the popularity of the fan array is in critical process facilities such as the new Intel Fab 24.2 expansion in Ireland. Intel expedited a white paper to enable the fan array concept to be used on the new expansion. In this example the fan array was built and tested to show a reduced power consumption of 50% over the traditional system employed in phase 1. In a further example of the popularity of the fan array, Legacy Hospital reduced the number of air handlers from two to one by selecting the Huntair fan array.

11. I also have specific knowledge that Huntair's competitors are copying my unique array and controller. For example, Cleanpak International copied the fan array and presented concepts and designs to Intel on a recent data center project in Oregon. Cleanpak was ultimately awarded a contract based on price and a fan array that is identical to my fan array. A Technical Bulletin showing evidence of copying is attached as Appendix E. Additional evidence of copying was submitted along with the Petition to Make Special.

I further declare that all statements made herein are of my own knowledge, are true, and that all statements made on information and belief are believed to the true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated: March 15, 2005

Lawrence G. Hopkins

EXHIBIT J

Luke Santangelo
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Cheryl Anderson-Siler
Trademark Attorney
Al Wiedmann Jr.
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May 13, 2005

Lawrence Hopkins
10781 SE Idleman Rd.
Portland, OR 97266

SENT BY US POSTAL SERVICE SIGNATURE CONFIRMATION™

RE: US Patent Application No. 10/806,775

Dear Mr. Hopkins:

I have recently reviewed the reply to the office action of September 15, 2004 in US patent application 10/806,775.

The subject matter of the claims of this application as amended by you in your response of March, 2005 are not patentable over the prior art. The following are examples of prior art references that are material to the examination of pending claims and that therefore should be provided by you to the USPTO according to 37 CFR 1.56. I have enclosed copies of all of the references specified below. Only copies of pages of *Woods Practical Guide to Fan Engineering* that are particularly relevant have been included herewith.

Presented below is a claim-by-claim indication of references that are material to the examination of the specified claim, in addition to an indication of column and line numbers of particularly relevant disclosure. As such, this letter itself is also material to the examination, and should also be forwarded to the USPTO along with the supplied references. Although the claims referenced below are as amended in March of 2005, even a cursory review of the enclosed references makes it clear that they would be material to the examination of any claims that address in any fashion the use of multiple fans and/or a multiple fan control system.

Claim 1:

4,241,871:
- col. 3-4

- col. 7, l. 63-col. 8, l. 11
- col. 3, l. 42-45

6,648,590

5,664,995
- col. 2, l. 50-65
- col. 5, l. 23-24
- col. 4, l. 17-22
- col. 5, l. 25-35, 42-47
- col. 8, l. 12-27, 37-39
- col. 2, l. 40

6,675,739
- col. 3, l. 28-33
- col. 1, l. 50-53
- col. 6, l. 43-46
- col. 4, l. 1-2

REDACTED

6,463,891
- Abstract
- col. 2, l. 56-60
- col. 3, l. 10-16
- col. 5, l. 56-60
- col. 8, l. 42-45
- col. 9, l. 13-21
- claim 3
- claim 4; col. 9, l. 49-51
- col. 4, l. 5-7
- col. 4, l. 32-34
- col. 4, l. 40-43
- col. 8, l. 55-61
- col. 7, l. 64 – col. 8, l. 2

6,257,832

- col. 5, l. 21-26 and l. 62-67
- col. 3, l. 36-37; col. 6, l. 7-9

6,386,969

- col. 2, l. 7-8
- Abstract

4,426,960

- col. 3, l. 15-25, 50-55
- claim 1
- col. 1, l. 21-24
- col. 2, l. 6-12
- col. 3, l. 50-55
- claim 2

5,745,041

- Abstract, generally
- col. 2, l. 29-31
- col. 3, l. 27-31, 32-34
- col. 5, l. 20-23

REDACTED

Morey, R. Vance, and Wilcke, William F., Selecting Fans, Determining Airflow for Crop Drying, Cooling, Storage, University of Minnesota, Extension Service, College of Agricultrual, Food and Environmental Science, FO-5716-C, Revised 1999 (hereinafter referred to as Morey and Wilcke)

- page 4

EP0205979A1:

- Abstract (page 1)
- p. 9, l. 20-27

Woods Practical Guide to Fan Engineering, Second Edition, Third Impression, Woods of Colchester Limited, 1964. TH7683 F3W65 1964 (hereinafter referred to as Woods Guide, Fan Engineering) – page 148

Claim 2:

4,241,871:

- col. 2, l. 22
- col. 4, l. 34-40

5,745,041

Morey and Wilcke

Woods Guide, Fan Engineering – page 121, 148

Claim 3:

5,745,041 (consider the length of 26d in fan axial direction)

Claim 4:

5,745,041

Claim 5:

6,463,891:

REDACTED

- col. 4, l. 10
- Fig. 2

Claim 6:

5,745,041 – see Fig. 2 (26)

Claim 7:

5,664,995 – Abstract
6,463,891 – col. 4, l. 35-39

Claim 8:

Woods Guide, Fan Engineering – page 208

Claim 9:

5,745,041

6,463,891

Claim 10:

5,745,041

6,463,891

Claim 11:

3,898,019

4,241,871

6,648,590

5,664,995

6,675,739, generally; See also, col. 4, l. 1

6,463,891

4,800,653 – col. 11, l. 62-68

6,386,826

- Fig. 1
- col. 2, l. 31

6,257,832

6,407,918

- col. 2, l. 22-23
- col. 3, l. 33; col. 6, l. 2-5

6,386,969 – Abstract

4,426,960

5,745,041

- Abstract
- housing – col. 2, l.
- plenum – col. 3, l. 32-34; col. 4, l. 51-53
- array configuration – col. 5, l. 20-23

5,136,465

6,031,717

5,572,403 – generally; see also Fig. 4

5,210,680

- Fig. 1
- col. 1, l. 58-63
- col. 3, l. 4-8

5,787,971

- col. 3, l. 40-42
- col. 8, l. 42-44

5,793,610

5,546,272

- col. 7, l. 54-60
- claims 1 and claim 4

Morey and Wilcke – page 4; Table 7

EP0205979A1:

- Abstract (page 1)
- p. 3, l. 11-23
- p. 9, l. 20-27

Woods Guide, Fan Engineering – p. 148

Claim 12:

- All references indicated above relative to the subject matter of claim 1 are also relevant to the subject matter of claim 12.

Claim 13:

5,210,680 – col. 3, l. 44-49

5,572,403 – col. 3, l. 40-42

5,745,041 – col. 3, l. 33-36 (ref. #26)

Morey and Wilcke

5,546,272 – col. 7, l. 54-60

4,241,871

6,407,918

- col. 4, l. 65-col. 5, l. 7
- see 26, 28, 30 of figs.

Woods Guide, Fan Engineering – p. 121

Claim 14:

5,210,680 – see Fig. 1

5,745,041 (consider the length of 26d in fan axial direction)

5,572,403 – Fig. 4, col. 8, l. 42-44

Claim 15:

6,407,918 – col. 4, l. 54-60, and Fig. 3

5,745,041 – col. 5, l. 20-30

Morey and Wilcke

Claim 16:

5,210,680 – see Fig. 1
5,572,403 – see Fig. 4

Claim 17:

6,407,918 – col. 4, l. 28-30

5,136,465

5,210,680

Claim 18:

Woods Guide, Fan Engineering – page 208

Claim 19:

6,407,918 – col. 4, l. 55-58
5,210,680 – Fig. 1

Claim 20:

5,210,680 – Fig. 1

Claim 21:

5,793,610 – col. 6, l. 14-17

4,241,871 – col. 3, l. 30-41

5,664,995 – Abstract; col. 3, l. 62-65

Woods Guide, Fan Engineering – page 148, second full paragraph

Claim 22:

6,031,717

- col. 2, l. 65 – col. 3, l. 5
- col. 4, l. 12-19
- col. 5, l. 4-19

Woods Guide, Fan Engineering – page 218

Claim 23:

4,241,871

6,648,590

5,664,995

6,675,739

6,463,891

6,257,832 - col. 5, l. 21-26 and l. 62-67

6,386,969

4,426,960

5,745,041

Morey and Wilcke

EP0205979A1

Woods Guide, Fan Engineering: p. 147, first full paragraph under *Operation of Fans in Parallel* heading; and pages 137-138 and 146.

Further, it is well known and motivated in all technological fields to operate any system at peak efficiency.

Claim 24:

4,241,871

6,648,590

5,664,995

6,675,739

6,463,891

6,257,832 - col. 5, l. 21-26 and l. 62-67

6,386,969

4,426,960

5,745,041

Morey and Wilcke

EP0205979A1

Woods Guide, Fan Engineering: p. 147, first full paragraph under *Operation of Fans in Parallel* heading; and pages 137-138 and 146.

Further, it is well known and motivated in all technological fields to operate any system at peak efficiency.

Claim 25:

5,664,995

- col. 2, l. 58-64
- col. 5, l. 32-35

6,463,891

- col. 2, l. 28-30
- col. 5, l. 22-25
- col. 8, l. 39-44

Woods Guide, Fan Engineering – page 148

Claim 26:

5,664,995

- col. 2, l. 58-64
- col. 5, l. 32-35

6,463,891

- col. 2, l. 28-30
- col. 5, l. 22-25
- col. 8, l. 39-44

Woods Guide, Fan Engineering – page 148

Claim 27:

4,241,871

6,648,590

5,664,995

6,675,739

6,463,891

6,257,832 - col. 5, l. 21-26 and l. 62-67

6,386,969

4,426,960

5,745,041

Morey and Wilcke

EP0205979A1

Woods Guide, Fan Engineering

Claim 28:

4,241,871

6,648,590

5,664,995

6,675,739

6,463,891

6,257,832 - col. 5, l. 21-26 and l. 62-67

6,386,969

4,426,960

5,745,041

Morey and Wilcke

EP0205979A1

Woods Guide, Fan Engineering

Claim 29:

4,241,871

6,648,590

5,664,995

6,675,739

6,463,891

6,257,832 - col. 5, l. 21-26 and l. 62-67

6,386,969

4,426,960

5,745,041

Morey and Wilcke

EP0205979A1

Woods Guide, Fan Engineering: p. 147, first full paragraph under *Operation of Fans in Parallel* heading; and pages 137-138 and 146.

Further, it is well known and motivated in all technological fields to operate any system at peak efficiency.

Claim 30:

4,241,871

6,648,590

5,664,995

6,675,739

6,463,891

6,257,832 - col. 5, l. 21-26 and l. 62-67

6,386,969

4,426,960

5,745,041

Morey and Wilcke

EP0205979A1

Woods Guide, Fan Engineering: p. 147, first full paragraph under *Operation of Fans in Parallel* heading; pages 137-138 and 146.

Further, it is well known and motivated in all technological fields to operate any system at peak efficiency.

Claim 31:

4,241,871

5,664,995 – col. 3, l. 12-15

* * *

Please understand that the above indications are by no means the result of a complete search. Indeed, for each claim, there may be several other prior art references that are relevant, and by no means should the fact that a certain piece of prior art is not cited relative to a certain claim be deemed an admission that such prior art is not material to the

examination. A limited study was conducted, and only that disclosure initially recognized as material is noted above.

Thank you for your cooperation in assuring the integrity of the US patent system. Please contact me if you have any questions.

Sincerely,
SANTANGELO LAW OFFICES, P.C.

Al Wiedmann Jr.

encl.

EXHIBIT K

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July 11, 2005

Karen Dana Oster
Law Offices of Karen Dana Oster, LLC
PMB 1020
15450 SW Boones Ferry Road #9
Lake Oswego, OR 97035

RE: US Patent Application No. 10/806,775

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Dear Ms. Oster:

As you are aware, we are intellectual property counsel to Acoustiflo, Ltd. I have recently reviewed the claim amendments and the Supplemental Information Disclosure Statement filed alongside the Request for Continued Examination filed by you on June 14, 2005.

The subject matter of the claims as currently pending in this application is not patentable over the prior art. The following are examples of prior art references that are material to the examination of at least one of the pending claims and that therefore should be provided to the USPTO according to 37 CFR 1.56. Column and line numbers point to passages of the patent reference that are particularly material. I have enclosed copies of the references specified below.

I will note that upon review of the Supplemental Information Disclosure Statement filed by you on June 14, 2005, it became apparent that US Pat. No. 4,426,960 was not among the cited patents. It seems, particularly upon review of the passages of that patent indicated below in light of the following standard for materiality as articulated by the Federal Circuit, that there can be little question as to the materiality of this reference:

> Materiality ... embraces *any* information that a reasonable examiner would be substantially likely to consider important in deciding whether to allow an application issue as a patent.

Bristol-Myers Squibb Co. v. Rhone-Poulenc Rorer, Inc., 326 F.3d 1226, 1234, 66 USPQ2d 1481, 1486 (Fed. Cir. 2003) (emphasis in original).

Patents material to the examination in this application include:

US Pat. No. 4,426,960

- column 1, lines 21-24
- column 2, lines 3-12
- column 3, lines 21-32
- column 5, lines 63-64
- column 6, lines 3-5
- column 6, lines 32-34
- column 7, lines 13-16

US Pat. No. 4,158,527:

- column 4, lines 37-40
- Fig. 6 shows peak efficiency

US Pat. No. 3,332,621:

- Fig. 4
- column 2, lines 6-10
- column 3, lines 61-65

US Pat. No. 5,269,660:

- column 1, lines 32-38
- column 2, lines 63-68
- column 3, lines 1-5
- column 3, lines 35-40
- column 4, lines 37-41
- column 4, lines 48-51
- column 6, lines 11-14
- column 6, lines 12-31
- column 7, lines 30-32

US Pat. No. 4,494,006:

- Abstract
- column 1, lines 12-14
- column 2, lines 45-50
- column 3, lines 4-7
- claim 1

* * *

As I'm sure you understand, our goal here is not to frustrate you or your client, but merely to ensure the integrity of the US patent system, particularly as it relates to the field of air handling. Unfortunately, for some reason, the PTO's search efforts in this application appear to be marginal at best, and we therefore feel obligated to attend to this important matter ourselves.

Thank you for your understanding and cooperation.

Sincerely,
SAINTANGELO LAW OFFICES, P.C.

Al Wiedmann Jr.

enc.

EXHIBIT L

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Cheryl L. Anderson
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December 23, 2005

Mr. Lawrence G. Hopkins
10781 SE Idleman Road
Portland, OR 97266

RE: US Patent Application No. 10/806,775
US Patent Application No. 11/097,561
US Patent Application No. 11/154,894

SENT BY US POSTAL SERVICE SIGNATURE CONFIRMATION™

Dear Mr. Hopkins:

As you are aware, we are intellectual property counsel to Acoustiflo, Ltd. I have recently reviewed materials filed in each of the above-referenced patent applications.

The subject matter of the claims as currently pending in these applications is not patentable over the prior art. The following are examples of prior art references that are material to the examination of at least one of the pending claims and that therefore should be provided to the USPTO according to 37 CFR 1.56. Column and line numbers point to passages of the patent reference that are particularly material. I have enclosed copies of the references specified below. Please note that I previously provided this information to Ms. Oster on July 11, 2005.

It seems, particularly upon review of the passages of that patent indicated below in light of the following standard for materiality as articulated by the Federal Circuit, that there can be little question as to the materiality of these references:

> Materiality ... embraces *any* information that a reasonable examiner would be substantially likely to consider important in deciding whether to allow an application issue as a patent.

Bristol-Myers Squibb Co. v. Rhone-Poulenc Rorer, Inc., 326 F.3d 1226, 1234, 66 USPQ2d 1481, 1486 (Fed. Cir. 2003) (emphasis in original).

Please also note that 37 CFR §1.56 indicates explicitly that the obligation to cite material art applies to "each inventor named in the application", among others.

Patents material to the examination in this application include:

US Pat. No. 4,158,527:

- column 4, lines 37-40
- Fig. 6 shows peak efficiency

US Pat. No. 3,332,621:

- Fig. 4
- column 2, lines 6-10
- column 3, lines 61-65

US Pat. No. 5,269,660:

- column 1, lines 32-38
- column 2, lines 63-68
- column 3, lines 1-5
- column 3, lines 35-40
- column 4, lines 37-41
- column 4, lines 48-51
- column 6, lines 11-14
- column 6, lines 12-31
- column 7, lines 30-32

US Pat. No. 4,494,006:

- Abstract
- column 1, lines 12-14
- column 2, lines 45-50
- column 3, lines 4-7
- claim 1

* * *

Again, our goal here is merely to ensure the integrity of the US patent system, particularly as it relates to the field of air handling. As you are no doubt aware, failure to disclose known prior art which is material to the examination of an application could potentially invalidate any patent issued in such a case. Thank you for your understanding and cooperation.

Sincerely,
SANTANGELO LAW OFFICES, P.C.

Al Wiedmann Jr.
enc.

EXHIBIT M

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

HUNTAIR, INC.,	)	Civil Action No. 07 C 6890
	)	
Plaintiff,	)	The Honorable David H. Coar
	)	
v.	)	Magistrate Judge Morton Denlow
	)	
CLIMATECRAFT, INC.,	)	
	)	
Defendant.	)	

CLIMATECRAFT, INC.'S INITIAL INVALIDITY CONTENTIONS

In accordance with the Court's Scheduling Order, Defendant, ClimateCraft, Inc., ("ClimateCraft"), hereby identifies to Huntair, Inc. ("Huntair") its Initial Invalidity Contentions. ClimateCraft notes that in stating these Initial Invalidity Contentions, it is doing so based on the information available to it at the present time. Approximately three months remain in fact discovery, Huntair has yet to provide its proposed claim construction and the expert discovery phase is many months away. Moreover, Huntair has not yet produced all of the documents sought by ClimateCraft, Huntair has produced essentially no development documents, Huntair has not separately identified the date of first public use, publication, offer for sale or sale of equipment covered by each of the claims of the two patents in suit, has not identified communications with others against whom it has asserted the patents in suit, has not provided the entirety of its foreign prosecution files, and, upon information and belief, has withheld information necessary to a full and fair identification of invalidity.

Additionally, Huntair's infringement contentions (Exhibit A) are so vaguely worded and conclusory that any understanding of its proffered claim scope is impossible to discern.

Specifically, Huntair has asserted infringement of claims that clearly require limitations that ClimateCraft's equipment not only lacks but cannot be retrofitted to provide. U.S. Patent Nos. 7,137,775 (the '775 patent) and 7,179,046 (the '046 patent) (collectively, the patents in suit), both of which are entitled, "Fan Array Fan Section in Air-Handling Systems," contain the same description and drawings but have different claims. The patents in suit are each directed to an air handler fan section comprising a plurality of fans arranged in a fan array.

The '775 patent has 2 independent claims – claims 1 and 16. The fan section of claim 1 includes at least six fan units arranged in a fan array in an air-handling compartment and "an array controller for controlling said at least six fan units to run at substantially peak efficiency by strategically turning selective ones of said at least six fan units on and off." The array controller is programmed to operate the fan units by strategically turning off at least one fan unit and running the remaining fan units. Claim 16 defines a fan array fan section having a plurality of independently controllable fan units arranged in a fan array and "an array controller for controlling said plurality of fan units to run at substantially peak efficiency by strategically turning selective ones of said plurality of fan units on and off."

The '046 patent has 3 independent claims — claims 1, 15 and 19. Claim 1 is directed to a fan section with multiple fans in a fan array combined with a "control system for operating said plurality of fan units at substantially peak efficiency by strategically turning on and off selective ones of said plurality of fan units." Claim 15 defines a fan section similar to claim 1 but the control system is "for controlling said plurality of fan units, said control system allowing control of the speed of the fan units in said plurality of fan units such that they run at substantially peak efficiency." The control system in claim 15 controls the speed of the fan units, while the control system defined in claim 1 turns the fan units on and off. The fan section of claim 19 includes

"independently controllable" fan units, and the control system is defined as "controlling the speed of the fan units in said plurality of fan units such that they run at substantially peak efficiency."

ClimateCraft's products, even if furnished with controls from an outside vendor, and even if specified for assembly in the field by an outside engineering firm, are not designed to provide fan arrays having independent fan control among the fans to run at substantially peak efficiency. No such control is provided. Accordingly, these products do not infringe either of the patents in suit. Specifically, the ClimateCraft project at Northwest Community Hospital in Arlington Heights, Illinois, which at the present time is the only system Huntair has accused of infringement, will lack such an independent fan control.

The structure and design of the ClimateCraft system referred to above has two fan assemblies, one for the supply side and one for the return side. The supply side fan assembly includes six fans, and the return side includes four fans. Each fan assembly is controlled by a single variable frequency drive ("VFD"), with a second "back up" VFD included for redundancy. The VFD in each assembly is controlled by the building automation system ("BAS"). The VFD operates all the fans in the group at the same speed, increasing or decreasing their speed within a selected range in response to changes in the structure's need for heating or cooling. The operation of the VFD is unaffected by a failure of one or more of the fans. The fans are selected so that all the fans in combination are capable of producing more than the design flow of the system. Thus, if there is an unexpected failure of one of the fans, the BAS will direct the VFD to increase the speed of the remaining fans within the preset range.

There is no array controller or control system in either fan assembly that operates the individual fan units selectively to achieve efficiency. Rather, the VFD in each fan assembly

operates all the fan motors in unison. More specifically, all the fan motors receive the same signal from the VFD, and thus every fan in the assembly always runs at the same speed as the other fans in the same assembly.

Likewise, there is no control system to independently turn fans on and off to affect the efficiency of operation. The only ability to turn fans on or off is provided by use of circuit breakers, required by code, which can be manually switched off, if desired, or which will automatically switch off in the event of a dangerous overload, as required by Code.

Notwithstanding these facts, Huntair asserts that its claims requiring "an array controller for controlling" the fans "by strategically turning selective ones [of the fan units] on and off" and merely states that a PLC "may constitute" such a device. This is hardly the model of clarity, and in fact is an admission that Huntair cannot prove that this claim element is satisfied by any ClimateCraft product.

Nevertheless, and within these limitations, and while reserving the right to supplement these contentions as discovery and trial preparation progresses, ClimateCraft identifies its initial invalidity contentions as follows.

At the present time, ClimateCraft believes each claim of the patents in suit is invalid pursuant to at least 35 U.S.C. § 112, ¶ 1, which requires that "[t]he specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention." As set forth above, each of the independent claims of the two patents in suit requires independent control of each fan in the fan array to run at "substantially peak efficiency." By virtue of claim dependency, all of

the claims of the two patents in suit therefore contain this requirement. However, there is no disclosure in the specifications of either patent in suit that describes or enables such control, thus violating the written description, enablement and/or best mode requirements of 35 U.S.C. § 112, ¶ 1.

Moreover, 35 U.S.C. § 112, ¶ 2 requires that "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." Many of the terms used in the patent are not defined and/or are used inconsistently, such that every claim of the patents in suit is invalid for indefiniteness, for containing claim language that is insolubly ambiguous. While a further refinement of its contentions may become possible during and after claim construction, ClimateCraft notes that, as used in the patents, the following claim terms are not susceptible to construction and are therefore indefinite. These terms include "fan array," "array controller for controlling … fan units to run at substantially peak efficiency by strategically turning selective ones of said … fan units on and off," "substantially peak efficiency," "strategically," "peak efficiency operating range," "a control system for operating said plurality of fan units at substantially peak efficiency," "programmable array controller," and "acoustically absorptive insulation surface." Because each of the claims of the patents in suit contains one or more of these terms, every claim of the patents in suit is invalid pursuant to 35 U.S.C. § 112, ¶ 2.

ClimateCraft reserves the right to assert invalidity of one or more of the claims of the patents in suit based on 35 U.S.C. §§ 102 and/or 103 based on Huntair's own activity in publishing, publicly using, selling and/or offering for sale subject matter either covered by or pertinent to the claims of the patents in suit. As noted above, Huntair has not yet produced all of the documents sought by ClimateCraft. Huntair has not separately identified the date of first

public use, publication, offer for sale or sale of equipment covered by each of the claims of the two patents in suit, so discovery on this topic has been thwarted. Likewise, Huntair has produced essentially no development documents and has not taken a firm position on its date of conception of the inventions set forth in the patents in suit, thus creating ambiguity as to what is prior art to the patent claims.

Nevertheless, depending on the claim construction Huntair asserts, each of the claims of the patents in suit are invalid pursuant to 35 U.S.C. § 102 and/or 35 U.S.C. § 103. While ClimateCraft's efforts to uncover more evidence of prior art and a better understanding of that which is already of record, it can identify the following references of pertinence to the validity of the claim, with specific information regarding each notated as follows. ClimateCraft specifically reserves the right to locate additional prior art and is actively pursuing the location of physical equipment that has been used, disclosed, sold or offered for sale and would thereby constitute prior art, some of which may correspond to the written references described herein.

An example of invalidating prior art is shown by air handling devices made, used, sold and/or offered for sale by AAON in the United States more than one year before Huntair's earliest claimed application filing date. These commercial devices are described in the attached claim chart (Exhibit B).

By way of a narrative explanation, the following is offered regarding the AAON commercial devices. The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297. In the AAON commercial devices, independent control of the individual fans is facilitated by the options available to the consumer listed at CL 303. These show that fans can be operated independently with separate variable frequency drives (VFDs). *See also* CL 295-297, 300. As shown in the AAON

commercial devices, with separate VFDs per fan, the fans could be separately turned on and off. CL 303; *see also* CL 295-297, 300. Generally, all fans individually have a peak operating range, outside of which they operate at a reduced efficiency. Operating fans at or near their known peak efficiency was common knowledge. The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. While the provision of independent VFDs per fan permits running the fans at different speeds with respect to one another, no written description, enabling disclosure or best mode of running the fans in any way is shown in the patents in suit. Additionally, as phrased, the term "substantially peak efficiency" is indefinite. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300. While controlling the fan units to operate outside of the range producing unstable operation is not specifically shown by the written materials describing the AAON commercial devices, controlling the operation of fans to prevent unstable operation has been known for many years. The fans used in the AAON commercial devices are plenum fans. CL 295-297. The AAON commercial devices include an airway path of less than 72 inches. CL 295-297. The AAON commercial devices are arranged in a "true array configuration. CL 295-297. The two-by-two arrangement of fans used in the AAON commercial devices includes at least two vertically arranged fan units. CL 295-297. Each of the fans used in the AAON commercial devices is positioned within a fan unit chamber. CL 295-297. An air relief passage or fan bypass damper was commonly known as a device to reduce fan flow by bypassing air from the high to low side of the fan. The AAON commercial devices were available with "perf. liners." These perforated liners were positioned within each fan unit chamber to provide an acoustically absorptive insulation surface. CL 297-299. As shown, the

four fans in the AAON commercial devices are mounted in a grid system. CL 297-299. The spacing between the fans in the AAON commercial devices is less than 60% of the fan wheel diameter of the individual fans. CL 295-297. The fan units of the AAON commercial devices are provided with backdraft dampers. CL 300. The AAON commercial devices contain a plurality of independently controllable fan units and each fan unit has an inlet cone, a fan, and a motor. CL 295-297. For example, as partially shown in the AAON disclosures, air handling devices include an array of fans, independent speed control and other features of the claims, as set forth in the accompanying claim charts. The written references illustrating features of the AAON commercial devices include those having Bates Nos. CL 295-303, separately described below.

Another example of invalidating prior art is shown by air handling devices made, used, sold and/or offered for sale by Governair in the United States more than one year before Huntair's earliest claimed application filing date. These commercial devices are also described in the attached claim chart (Exhibit C).

By way of a narrative explanation, the following is offered regarding the Governair commercial devices. The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. At CL 9576, four fans are shown for exhaust. The Governair commercial devices include three supply fans provided with airfoil isolation dampers allowing the fans to be operated independently of each other. CL 9567. VFDs were provided to permit variable speed control; "the customer specified the use of Graham VFD controls on both the supply and exhaust fans, a detail which Governair was easily able to accommodate with its manufacturing flexibility." CL 9570-9571. Multiple fan arrays were provided with "independent VFD controls." CL 9572. The four exhaust fans are "staged" to control building pressure. CL 9576.

The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Generally, all fans individually have a peak operating range, outside of which they operate at a reduced efficiency. Operating fans at or near their known peak efficiency was common knowledge. The four exhaust fans are "staged" to control building pressure. CL 9576. Investigation continues into the control of the Governair commercial devices. CL 9565-9576. The fans used in the Governair commercial devices are plenum fans. *E.g.*, CL 9572. The Governair devices are arranged in a "true array" fashion. CL 9567, 9574-9575. The Governair devices include at least two vertically arranged fans in the fan array. CL 9574-9575. The Governair devices are arranged in a fan unit chamber. CL 9567, 9574-9575. The multiple fan units of the array in the Governair commercial devices are mounted in a grid system. CL 9574. The spacing between the fans in the Governair commercial devices is less than 60% of the fan wheel diameter of the individual fans. CL 9574. Backdraft dampers are provided in line with the respective fan units. CL 9567, 9571. All of the fan units shown in the Governair literature have fan units having an inlet cone, a fan and a motor and are provided with independent VFDs. CL 9570. The written references illustrating features of the Governair commercial devices include those having Bates Nos. CL 9565-9576, separately described below.

Additionally, the following discussion of European Patent Application EP 0 004 448 (CL 4605-4620), published on October 3, 1979 on behalf of Beard, is offered. This reference discloses a method and apparatus for controlling a stationary fan-cooled cooling system using a fan array. Thus, the reference discloses the use of multiple fans arranged in an array in circumstances where a large volume of air must be moved, as an energy-saving improvement over the use of a single fan

which would waste power except under conditions of high load. Page 2, lines 16 through 19. Thus, fans are selectively turned on or off to achieve energy savings by a controller. Page 2, line 24 through page 3, line 1. As many as eight fans are specifically recited in the fan array. Page 8, lines 11 through 13. Moreover, the fans can be independently controlled for speed. Page 8, lines 25 through 27. As also shown on the attached claim chart (Exhibit D), this reference invalidates most of the claims of the patents in suit under 35 U.S.C. § 102, and invalidates the others under 35 U.S.C. § 103.

In similar fashion, as another example of patent claim invalidity, the following discussion of U.S. Patent No. 6,481,635 (Bates Nos. CL 5286-5298), issued on November 19, 2002 to Riley, *et al.*, is offered. This patent is entitled "Environmental Control Method" and discloses a method and system for controlling the environment of storage facilities. Movement of air within the facility is accomplished by air-handling units. The speed of each fan is controlled by a variable-speed drive, allowing the fans to run at speeds below full capacity. Environmental parameters, such as temperature or humidity, are monitored to determine the existing state of the environment which is then compared to a desired state. The speed of the fans or air-handling units is adjusted to alter the existing environmental state, bringing it in alignment with the desired state. The fans or air-handling units are operated continuously, typically at reduced capacity. Other various facets are included with the system and method, including the control of the admittance of external air into the storage facility. Again, as shown on the attached claim chart (Exhibit E), this reference invalidates most of the claims of the patents in suit under 35 U.S.C. § 102, and invalidates the others under 35 U.S.C. § 103.

Additional prior art is described generally as follows. Many of these references disclose features claimed in the patents in suit and could be described in yet additional claim charts.

ClimateCraft has not yet formulated its final invalidity contentions and will undoubtedly choose to select additional prior art to illustrate the invalidity of the patent claims. Consequently, the absence of a claim chart for any given reference should not be construed as a statement that ClimateCraft does not rely on the reference for its invalidity contentions.

U.S. Patents and Publications

U.S. Patent No. 1,493,497 (Bates No. CL 4653-4660), issued on May 13, 1924 to Otis, is entitled "Unit Ventilator" and discloses a damper assembly for use with a fan-driven air moving structure.

U.S. Patent No. 1,517,764 (Bates No. CL 4661-4667), issued on December 2, 1924 to Still, is entitled "Heating System" and discloses a forced air furnace providing airflow through a duct coordinated by a plurality of ducts.

U.S. Patent No. 2,108,738 (Bates No. CL 4735-4740), issued on February 15, 1938 to Allen, is entitled "Twin-fan Structure" and discloses a plurality of fan units disposed in the same plenum designed to achieve a greater movement of air for the same power, i.e. a more efficient use of fans in an air handling apparatus. Of note is provision of two fans, side by side, that can be operated either in unison or separately. Col. 1, lines 32 through 35. Backdraft dampers prevent loss of efficiency. Col. 5, lines 30 through 35. The twin fans thereby deliver improved air delivery from smaller fans at lower speeds, thereby minimizing noise. Col. 1, lines 21 through 28.

U.S. Patent No. 2,175,641 (Bates No. CL 4741-4744), issued on October 10, 1939 to Replogle, is entitled "Motor and Fan Unit" and discloses a multiple fan air moving unit. The reference thus discloses a plurality of fans in Fig. 1 and a conical ring assembly at page 2, line 64 (left column).

U.S. Patent No. 2,300,475 (Bates No. CL 4746-4750), issued on November 3, 1942 to Ward, is entitled "Ventilating Device" and discloses a pair of serial fans, constructed and arranged to reduce the noise produced by an air handling unit.

U.S. Patent No. 2,634,048 (Bates No. CL 4751-4753), issued on April 7, 1953 to McDonald, is entitled "Fan System" and discloses a plurality of parallel fans providing airflow to a common exhaust. The device thus discloses a parallel fan assembly to achieve improved results while avoiding unstable operation, and further discloses the pressure-volume characteristic curves of each of the two fans as connected. Col. 2, lines 28 through 56; *See also* Fig. 4. Note that the reference teaches the use of multiple, parallel fans, and discloses that where the fans have backwardly curved blades, running them into a common plenum is not problematic. Col. 1, lines 13 through 21.

U.S. Patent No. 2,901,959 (Bates No. CL 4754-4757), issued on September 1, 1959 to Kinney, is entitled "Air Distributing System" and discloses an air distribution system utilizing a manifold to communicate the central air-passageway of the device. Multiple fans in series are disclosed.

U.S. Patent No. 3,096,933 (Bates No. CL 4758-4763), issued on July 9, 1963 to Bora, is entitled "Portable Fume Exhaust Fan Apparatus" and discloses a plurality of fans operating in series as a part of an air handling device. The device is designed to be sufficiently lightweight for the air-moving capabilities it possesses to be portable. Multiple fans in series are disclosed.

U.S. Patent No. 3,156,233 (Bates Nos. CL 0757-0760), issued on November 10, 1964 to O'Connell, is entitled "Sealing and Sound Absorbing Means for Air Handling Apparatus" and discloses a sound absorbing medium and bottom seating device for an air handling apparatus. The device shown is adaptable to an air handler that is convertible to any one of a bottom inlet, a left

side inlet or a right side inlet of the return air from a duct system in a residence or building where the furnace or air handler is installed.

U.S. Patent No. 3,332,621 (Bates Nos. CL 0761-0766), issued on July 25, 1967 to Tanner, is entitled "Automatic Control Means" and discloses a system for automatically controlling multiple fans for temperature regulation. Fig. 4 illustrates the control of a plurality of fans by selectively turning fans on and off and by selectively controlling the fan speed of individual fan units. At Col. 2, lines 6 through 10, a control for activating and deactivating a plurality of fan units is disclosed. At Col. 3, lines 61 through 65, a temperature control is disclosed for control of the cams.

U.S. Patent No. 3,398,880 (Bates No. CL 4764-4765), issued on August 27, 1968 to Wallin, is entitled "Centrifugal Fan" and discloses a two by two array of fans in an air handling apparatus. *See* Fig. 2, Element 3; Col. 2, lines 17 through 19, claim 5).

U.S. Patent No. 3,898,019 (Bates Nos. CL 0767-0771), issued on August 5, 1975 to Reznick *et al.*, is entitled "Air Fan Apparatus" and discloses a system having a plurality of fans arranged in transverse pairs, one pair above the other, to discharge their air output into a common plenum. Col. 1, lines 27 through 33. This device thereby reduces the cost, weight and the volume of space that would be occupied by fewer larger air fans of like capacity, and also obtaining a more efficient air distribution in the respective upper and lower portions of the plenum. *Id.* Each of the fans has a housing fixedly mounted on a support frame and its fan rotor, shafts, bearings, drive motor, and drive mounted on vibration-damping components mounted on said frame. This construction thereby isolates the fan housing from the effects of vibration.

U.S. Patent No. 4,021,213 (Bates Nos. CL 0772-0777), issued on May 3, 1977 to Neidhardt *et al.*, is entitled "Food Storage Refrigeration Cabinet having Optional Fast Chill Cycle" and discloses a food storage refrigeration cabinet suited for operation either on a conventional

refrigeration cycle or on a fast cool down refrigeration cycle. The disclosed cabinet has partition structure that separates a food storage space from a defined plenum, and the evaporator coil of the refrigeration system is located inside the plenum. The partition has inboard and outboard openings to define recirculating air flow paths over the evaporator coil from and to the food storage space. For use of the cabinet on a conventional refrigeration cycle, first fan means in the inboard openings draws air from the storage space and passes the same over the evaporator coil for discharge out the outboard openings back to the storage space, and the refrigeration system is cycled on and off in order to maintain the enclosure air within the proper temperature range. When the cabinet is operated on the cool down cycle, second fan means located in the outboard openings also are operated to discharge the chilled plenum air downstream of the evaporator coil from the outboard openings for highly turbulent circulation in the storage space. The cycle is terminated when the food itself as sensed by food probes reaches the desired storage temperature or after a set timed interval, and during the cycle the refrigeration system preferably runs continuously. The refrigeration system has two to three times the cooling capacity required to maintain the same storage space at the desired storage temperature, and the air in the storage space is extremely turbulent when all the fans are operating. The reference thus discloses a device in which an array of fans is used to expand the range of efficient cooling over that available by the use of a single fan.

U.S. Patent No. 4,106,076 (Bates No. CL 4766-4777), issued on August 8, 1978 to Miller, *et al.*, is entitled "Circuit Module" and discloses a circuit module having a supporting framework. The framework also serves as a voltage and ground bus structure to provide appropriate connections for voltage distribution to circuit boards which are assembled on the framework to form the walls of the module. The completed structure defines a plenum chamber, and multiple fans are positioned to cool the air within the structure.

U.S. Patent No. 4,139,052 (Bates No. CL 4778-4787), issued on February 13, 1979 to Lackey, is entitled "Roof Top Air Conditioning Unit" and discloses an air conditioning unit. The indoor air flow section is arranged to receive and return indoor air either through its bottom portion, in a vertical air flow mode, or through its end wall, in a horizontal air flow mode. The unit may thus be either roof top mounted or slab mounted, without the need of any added section or module furnished by the manufacturer. A pair of fans is used in the structure disclosed. The indoor air flow section includes a draw-through refrigerant coil located in an upper quadrant of the section, a detachable panel separating two lower quadrants in the section for the vertical air flow mode and movable to separate a lower and upper quadrant for the horizontal air flow mode, and removable end wall panel means covering the end in the vertical air flow mode and being positioned to cover the bottom for the horizontal air flow mode. Additionally, the construction is such that the provision of electric heat, various air flow control options and adaptability of the unit to heat pump operation are all accommodated.

U.S. Patent No. 4,158,527 (Bates Nos. CL 0785-0794), issued on June 19, 1979 to Burkett, is entitled "Adjustable Speed Drive System for Centrifugal Fan" and discloses a multi-fan system provided with dampers. As shown in Col. 4, lines 37-40, "[i]f a particular flow control system involves a plurality of fans, comparator 34 must be capable of recognizing a demand signal which exceeds the rate of flow of a single fan and thereafter split the demand signal so as to bring a second fan into operation." Fig. 6 illustrates determining a zone of peak efficiency.

U.S. Patent No. 4,239,020 (Bates No. CL 4788-4802), issued on December 16, 1980 to Kiyokawa, *et al.*, is entitled "House and Method for Livestock Raising" and discloses a method of temperature control in a structure such as a chicken coop or barn.

U.S. Patent No. 4,241,871 (Bates Nos. CL 0795-0805), issued on December 30, 1980 to Newell, III *et al.*, is entitled "Apparatus and Method for Ventilation of Animal Enclosures" and discloses a ventilation system that is automatic, adapted for an enclosure for animals, fowl and the like. A plurality of exhaust fans are controlled by respective thermostats set for operation at respective individual temperatures over an operating range of temperatures. Movable baffles at air inlet apertures are adjusted under the control of a differential-pressure sensing means to regulate the rate of flow of air through the inlet apertures to maintain a desired difference between the barometric pressure within and without the enclosure irrespective of the number of banks of fans in operation. Thus, when the thermostat set at the highest temperature is actuated, the movable baffles are adjusted for maximum flow irrespective of the output of the differential-pressure sensing means, thereby establishing a second, and smaller, differential pressure. If the primary power source should fail, a second power source is automatically utilized to adjust the inlet baffles to a position of maximum opening, with automatic return to normal operation upon revival of the primary power source. The reference thus discloses a device that affords independent control of a plurality of fan units to achieve maximum efficiency by insuring that only those fans necessary to the desired result are being used, thereby providing an efficiency not otherwise achievable by use of an individual fan. Fig. 2, Element 34; claims 1, 7 and 14; Col. 4, lines 1 through 16. At Col. 2, lines 26 through 30 and 42 through 50, the apertures are positionable depending on the desired operation of the fans. The six fan array disclosed is operable to provide the desired performance. Col. 4, lines 3 through 8, lines 34 through 40; also Col. 7 line 63 through Col. 8, line 11. The reference thus discloses a pressure sensor and thermostat controlling closure drive for array of six fans.

U.S. Patent No. 4,392,417 (Bates No. CL 4814-4827), issued on July 12, 1983 to Johannsen, is entitled "Variable Dead Band Pressure Control System" and discloses a pressure control system

for an air distribution system. The system includes a supply blower, a distribution duct network and a plurality of air outlets, including a plurality of pressure sensors positioned at various points in the air ducts to measure pressure therein. Controls are provided for selecting the lowest of the sensed pressures and the low pressure signal becomes one input to a variable dead band controller. Another input is an adjustment for commanding the desired system pressure. The controller compares the pressure to a dead band threshold established about the set point and delivers appropriate signals to an actuator which operates through a linkage to control the inlet vortex vanes and hence the air flow of the supply blower. A wide dead band is used to avoid hunting of the system, but when a response is required a narrow dead band is used to ensure that the system drives to the set point. Controls are provided to periodically reset the controller to its narrow dead band position to prevent drift of the system. For systems also including a return blower an additional controller is provided to operate its actuator to control its inlet vanes. Controls are provided for developing feedback signals indicative of air flow in the supply and return blowers, and these signals are applied to calibration circuits to the controller. The calibration circuits are specially designed to provide independent adjustment of maximum and minimum air flow tracking between the supply and return blowers. As noted, "[i]n larger systems it is common to use multiple blowers or fans." Col. 1, lines 56 through 60. Variable speed motors are used for air volume control. Col. 5, lines 62 through 63.

U.S. Patent No. 4,426,960 (Bates Nos. CL 0806-0812), issued on January 24, 1984 to Hart, is entitled "Control Circuitry for Multistage Fans" and discloses a solid-state, multistage temperature controller for automatically controlling the operation of fans to maintain the temperature of an associated engine within pre-selected limits. Multiple fans are provided to cool an engine. Col. 1, lines 21 through 25. Independent control of the fans is provided to selectively

turn on and off the fans, to prevent overloading the power. Col. 2, lines 6 through 13. *See also* Col. 3, lines 14 through 24 and lines 50 through 55.

U.S. Patent No. 4,494,006 (Bates Nos. CL 0813-0818), issued on January 15, 1985 to Staroselsky *et al.*, is entitled "Method and Apparatus for Controlling a Multicompressor Station" and discloses a method of control and control apparatus for load sharing between multiple compressors working in parallel and/or in series. The system enables all of the load-sharing compressors to carry their optimum share of the load. The system is controlled to follow the safest load-sharing formula and also provides for substantial energy savings, thereby controlling the compressors to operate at peak efficiency. The system automatically divides the load whenever a strong decoupling between process control and compressors after the compressors' operating points cross their surge control lines. Thus, a system is disclosed which distinguishes from older control systems. Col. 1, lines 12 through 14. The system provides "optimization of the load-sharing between multiple compressors by controlling the criterion representing the relative distance between operating point of compressor and its surge control line on the equal level for all load-sharing compressors in operation." Col. 2, lines 45 through 50. Fig. 1 shows a compressor station with a control system including a load control loop. Col. 3, lines 4 through 7; Fig. 1.

U.S. Patent No. 4,497,242 (Bates No. CL 4845-4851), issued on February 5, 1985 to Moyer, is entitled "Ventilation Control System" and discloses a method for preventing the unnecessary removal of heated or cooled room air by fume hoods during off-peak periods through a manual and automatic fume hood ventilating system. Ventilation (exhaust) air quantities are reduced in response to operator and/or automated programmed control of the exhaust fan shaft speed. The safety integrity of the fume hood system is improved by providing the operator with visual and audible dynamic feedback of the system operating status. Room air balance is maintained through

subsequent reset of the room supply air coincident with exhaust air quantity adjustment. Building make-up air balance is possible using individual instantaneous exhaust flow summary signals to control the outside air flow rate.

U.S. Patent No. 4,648,007 (Bates No. CL 4852-4856), issued on March 3, 1987 to Garner, is entitled "Cooling Module for Electronic Equipment" and discloses a module for cooling equipment mounted in a frame. The module includes a plenum positioned between an upper portion and a lower portion of electronic equipment and a panel positioned across the plenum to occlude it. The panel is of multiplanar arcuate construction and includes a first, a second and a third panel portion. Each panel portion is provided with an aperture communicating with a fan. A pair of vanes between adjacent fans are provided. The vanes align themselves with the air flow from adjacent fans when both adjacent fans are operational and position themselves across the aperture of an adjacent fan when failed.

U.S. Patent No. 4,651,922 (Bates Nos. CL 0819-0827), issued on March 24, 1987 to Noba, is entitled "Apparatus for Controlling Rotational Speed of Radiator Fan" and discloses a cooling system for a radiator in an internal combustion engine. The cooling system is provided with a pair of fans connected to a first motor for a small electric current and a second motor for a large electric current, respectively. Relays are provided for operating the first and/or second motor sequentially in accordance with the degree of cooling requirement of the engine. A delay device is provided for delaying the operation of the relay(s) for attaining a stronger cooling requirement for a predetermined short period just after the engine is started. A generation of rush current in the relay contacts is prevented.

U.S. Patent No. 4,700,887 (Bates No. CL 4857-4874), issued on October 20, 1987 to Timmons, is entitled "Environmental Control System for Poultry Houses" and discloses a method

and apparatus for controlling environmental conditions in a poultry house. The static parameters of the house are determined, and thereafter continuous measurements are made of current inside and outside temperatures. The operator makes periodic assessments of litter condition in the house, and adjusts the target 24-hour average relative humidity to produce the desired litter condition. The system controls the heating and ventilation system to obtain the desired 24-hour average relative humidity while maintaining the optimum temperature conditions in the house for maximum economic return.

U.S. Patent No. 4,800,653 (Bates Nos. CL 0835-0848), issued on January 31, 1989 to Steffen, is entitled "Method and Apparatus for Controlling the Drying and Cooling of Field-harvested Seeds in Storage" and discloses a method and apparatus for conditioning and preserving living seeds in a bin. Air is forced into the bin via a plenum chamber in the lower part of the bin. The air passes through a floor pervious to gas flow forming the top of the chamber. A heater, such as a heat lamp, is used to heat the air in the plenum chamber. A variation is disclosed wherein the heating means and plenum chamber are located in the upper part of the bin, and the air flow is from top to bottom. The process comprises measuring the temperature of drying air in the plenum chamber, measuring the temperature of exhaust air leaving the bin, and turning off the heater when the difference between the two temperatures exceeds a predetermined level. Energy is introduced into the plenum air to supplement the air's natural capacity for holding moisture. A temperature sensing element in the exhaust air activates or deactivates the energy sources according to a pre-selected (manual or automatic) allowable temperature depression that occurs from evaporative cooling. The differential setting is selectively controllable to accommodate the hygroscopic properties of differing seeds and variations of seasonal temperatures and humidities. The reference thus discloses a fan array in a plenum in which dampers close off airflow through

individual fan units that are selectively turned off. Control of the fan array is provided using input from a number of variables, including temperature gradient, humidity, and ambient conditions. The use of multiple fans to conserve electricity (efficiency) is specifically recognized. Col. 11, lines 62-67.

U.S. Patent No. 5,069,113 (Bates No. CL 4883-4894), issued on December 3, 1991 to Mattson, *et al.*, is entitled "Stacked and Cross-connected Recirculating Fans in a Semiconductor Manufacturing Cleanroom" and discloses a pair of recirculating fans for semiconductor cleanroom use. The fans are stacked to allow each fan to service a smaller zone in the cleanroom than if the fans were placed side by side. Each fan controls the temperature, humidity, and particulate count for its own zone of the cleanroom, thereby allowing strict control of these parameters. The ductwork of the two fans are cross connected so that either fan can be maintained or repaired while the other fan services its own zone and the zone normally serviced by the off-line fan.

U.S. Patent No. 5,088,886 (Bates Nos. CL 4895-4899), issued on February 18, 1992 to Hopkins, is entitled "Inlet Air Flow Conditioning for Centrifugal Fans" and discloses a grate of rigid intersecting strips positioned across the inlet cone of a fan for diffusing the vortex of inlet air to the fan and to induce a uniform velocity gradient at the fan blades. This conditioning of the inlet air reduces turbulence during operation of the fan and, therefore, noise and vibration.

U.S. Patent No. 5,095,811 (Bates No. CL 4900-4915), issued on March 17, 1992 to Shutic, *et al.*, is entitled "Automotive Powder Coating Booth with Modulated Air Flow" and discloses a structure for powder coating relatively large objects. A spray booth having an interior having a cut-in coating zone of relatively large surface area is provided to permit application of powder onto the interior portions of the vehicle body. A side coating zone area wherein the vertically oriented, exterior surfaces of the vehicle body are coated is also provided. An overhead coating zone in

which the horizontally oriented, exterior surfaces of the vehicle body are coated is also provided. These zones are connected by two transition zones separating. Air infeed and exhaust devices associated with each coating zone and each transition zone are operated to vary the air flow rate within the booth interior in the course of movement of the vehicle body through the structure. The air velocity in each coating zone is maintained below a predetermined maximum downdraft velocity throughout the coating operation, and such that a slightly negative pressure is maintained within the booth interior.

U.S. Patent No. 5,136,465 (Bates Nos. CL 0849-0859), issued on August 4, 1992 to Benck *et al.*, is entitled "Personal Computer with Tandem Air Flow Dual Fans and Baffle Directed Air Cooling" and discloses a device adapted for use in personal computers. In this reference, fans are provided in serial fashion, providing cooling of computer components. The personal computer has an enclosure for its operating components, a printed circuit board mounted within the enclosure, and heat generating components mounted on the printed circuit board. A fan is provided to draw air into the enclosure and another fan is provided to expel air from the enclosure. An air flow directing baffle mounted within the enclosure in the path of air flow from one fan toward the other fan and adjacent the heat generating components is provided to direct the flow of air through the enclosure.

U.S. Patent No. 5,192,348 (Bates Nos. CL 4930-4937), issued on March 9, 1993 to Ludwig, is entitled "Directional Air Diffuser Panel for Clean Room Ventilation System" and discloses a clean room diffuser panel for positioning below a ceiling grid mounted filter element. The diffuser panel is perforated throughout its area with increased size and density of perforations in a peripheral region to provide increased airflow beneath the ceiling grid. The peripheral regions are further angled or provided with directional vanes to create a lateral airflow beneath the ceiling grid.

U.S. Patent No. 5,207,614 (Bates Nos. CL 4938-4948), issued on May 4, 1993 to Passadore, is entitled "Clean Room Air System" and discloses a clean room supplied with air at a controllable velocity from a blower with a variable damper mechanism. The ceiling of the clean room is comprised of a plurality of panels of particulate filter material Associated with at least some of the panels are air dampers comprised of first, second, and third adjacent perforated plates. The first plate is fixed and the second plate is mounted for translational movement relative to the first. The third plate is interposed between the first and second plates as a gasket to reduce air flow between the plates. By moving the second plate relative to the first, the perforations therein are selectably opened or occluded, permitting the air passing through each panel to be regulated. Air flow through the room as a whole is controlled by the variable air flow feature of the blower.

U.S. Patent No. 5,210,680 (Bates Nos. CL 0860-0871), issued on May 11, 1993 to Scheibler, is entitled "Card Cage Having an Air Cooling System" and discloses a cooling system for the air in a card cage. The system employs deformable baffles in the air flow path to the spaces between the printed circuit cards. The baffles are deformed upon assembly in order to adapt to the thermal conditions to be expected during operation of the card cage. The baffles provide minimum openings which produce a pressure in front of the openings, to effect a more uniform flow distribution via the openings and to permit an increase in the air flow rate to the printed circuit cards. The use of a fan array is therefore shown.

U.S. Patent No. 5,230,604 (Bates No. CL 4949-4983), issued on July 27, 1993 to Glaser, *et al.*, is entitled "Multiple Fan Turret Unit for Use within a Tower Unit" and discloses a self-contained fan turret unit for use with a tower air recirculating system. A housing positionable for attachment to the tower system is provided. The housing includes an extendable column assembly bearing a turret assembly to which are attached one or more fans, inlet bells and discharge

cones. The turret assembly is movable from a position within the housing to one above the housing by the column assembly. The turret is supported by an air spring isolator and, when extended, is connected to the housing and the tower unit by flex joint isolators. A cowling is also provided for releasable attachment to the turret. The turret is rotatable and extendable arms are provided to interconnect the column assembly and the fans for selective removal thereof from the turret.

U.S. Patent No. 5,269,660 (Bates Nos. CL 0872-0881), issued on December 14, 1993 to Pradelle, is entitled "Method and an Installation for Adjusting the Flow Rate of Air in a Network of Ducts" and discloses a system for handling air. The system adjusts the flow rate of air in a network of ducts such as those provided a mine. The system comprises a fan provided with an electric motor powered at a variable frequency. The system also includes a converter having an adjustable output frequency and measuring means for measuring the flow rate and the total pressure supplied by the fan. The system provides a processor, memory for storing in digital form at least one total-pressure/flow-rate characteristic curve, and optionally a pressure/flow-rate characteristic curve of the fan for at least one predetermined speed. Means for displaying said curves is provided and data input means enabling a reference value (Q.sub.c) to be given to the flow rate to be conveyed by the network are provided. A central calculation unit calculates the resistance (R) of the network and the flow rate (Q) flowing therethrough at a given instant based on data provided by the measuring means. The central calculation unit calculates the speed to be given to the fan by interpolation utilizing the results of the preceding calculation and of the reference value for the flow rate. Thus, control of a fan array is provided. Each of the fans in the array is provided with independent control. Col. 3, lines 35 through 40. Fan efficiency data is stored and give another operating parameter as a function of flowrate. Col. 4, lines 37 through 42. Operation of the fan "over a limited range of speeds for which the efficiency of the fan remains satisfactory" is predicted. Col. 4,

lines 48 through 51. Operation of the fans can be arranged in series or in parallel; parallel operation is desired where the flowrate is either "very high or … very variable" as "low flow rates can be obtained by stopping one of the fans." Col. 6, lines 25 through 32. A computer controls and monitors the operation of the fans. Col. 7, lines 30 through 32.

U.S. Patent No. 5,370,576 (Bates Nos. CL 0882-0890), issued on December 6, 1994 to Krofchalk, is entitled "Sidewall Vent-mounted Fan Assembly for a Truck Cab" and discloses a fan assembly. A forced flow of outside ventilation air may be selectively directed into the cab of a truck using a specially designed fan assembly that works in conjunction with an existing vent structure disposed within a ventilation passage extending through a wall of the cab. The existing vent structure has a control member which is manually operable from the interior of the cab to selectively permit or preclude outside air inflow to the cab interior through the ventilation passage. The fan assembly includes a housing having an open front side, and an open rear side secured to the cab wall portion over the inner side of the ventilation passage. A cover plate having a pair of air flow openings therein is secured to the front side of the housing for pivotal movement relative thereto between a closed position in which the cover plate blocks the front housing side, and an open position providing manual access to the vent structure control member through the housing interior. Mounted on the inner side of the cover plate, over its air flow openings, are a pair of small ventilation fans. With the cover plate in its closed position and the vent structure opened, operation of the ventilation fan draws outside air inwardly through the vent structure and the ventilation passage and forces the outside air into the interior of the cab.

U.S. Patent No. 5,417,433 (Bates No. CL 4984-4987), issued on May 23, 1995 to Phillips, is entitled "Ventilated Gaming Table Assembly" and discloses a ventilated gaming table having a plurality of electric fan subassemblies mounted about the periphery of the table. The fan

subassemblies are independently operable. Fig. 3, element 48; Col. 2, lines 37 through 39; claim 1 (sub-elements d through f).

U.S. Patent No. 5,454,756 (Bates Nos. CL 4988-4999), issued on October 3, 1995 to Ludwig, is entitled "Clean Room Ventilation System" and discloses a clean room ventilation system having a diffuser panel attached to a ceiling grid, with a filter element positioned well above the panel. The diffuser panel is perforated throughout its area with increased size and/or density of perforations in a peripheral region to provide increased airflow beneath the ceiling grid. The peripheral regions may further be angled to create a lateral airflow beneath the ceiling grid.

U.S. Patent No. 5,467,250 (Bates No. CL 5000-5017), issued on November 14, 1995 to Howard, *et al.*, is entitled "Electrical Cabinet with Door-mounted Heat Exchanger" and discloses an electrical equipment cabinet having a door-mounted, air-to-air heat exchanger. The heat exchanger provides cooling to the equipment housed in the cabinet while maintaining a closed or sealed environment within the cabinet. An arrangement of ducts and vents is used to force interior and exterior air through the heat exchanger using powered fans mounted within the main portion of the cabinet. The mounting of the heat exchanger on or within the door of the cabinet makes more efficient use of the space available within the cabinet, and the placement of the fans within the main portion of the cabinet protects them from damage and avoids the need to provide electrical power to the door.

U.S. Patent No. 5,544,012 (Bates No. CL 5018-5039), issued on August 6, 1996 to Koike, is entitled "Cooling System for Cooling Electronic Apparatus" and discloses a cover provided on at least one of the faces of a box body. A plurality of elements to be cooled are arranged in tiers within the box body so as to be opposed to one face of the box body. A horizontal duct is provided at a lower part within the box body. A vertical duct is provided between the elements and the cover.

Guide members are situated within the vertical duct and the box body. The guide members guide the air stream, sucked into the elements, and the air stream exhausted from the elements along predetermined passages.

U.S. Patent No. 5,546,272 (Bates Nos. CL 0891-0902), issued on August 13, 1996 to Moss *et al.*, is entitled "Serial Fan Cooling Subsystem for Computer Systems" and discloses a cooling subsystem and method for a chassis of a computer system. The cooling subsystem comprises a pair of cooling fans, each fan having its own drive motor, and a common plenum shrouding and providing a pathway for air communication between the pair of fans.

U.S. Patent No. 5,572,403 (Bates Nos. CL 0903-0911), issued on November 5, 1996 to Mills, is entitled "Plenum Bypass Serial Fan Cooling Subsystem for Computer Systems" and discloses a cooling subsystem and method for a chassis of a computer system. The cooling subsystem comprises first and second cooling fans with individual drive motors and a common plenum substantially shrouding and providing a pathway for air communication between the first and second cooling fans. The fans cooperate to provide an optimum rate of air flow from outside the chassis to inside the chassis to provide air exchange within the chassis. The common plenum permits the first and second fans to cooperate to provide a minimum air flow to cool the specified device when one of the fan motors fails. The plenum comprises a bypass aperture therein for allowing the air to alternatively enter and exit the plenum, the bypass aperture increasing a rate of air flow across the subsystem when a selected one of the first and second motors fails. *See* Col. 3, lines 35 through 43.

U.S. Patent No. 5,586,861 (Bates Nos. CL 5049-5057), issued on December 24, 1996 to Berger, is entitled "Airflow Measuring Centrifugal Fan" and discloses a centrifugal fan is provided with an inlet cone that serves to measure air flow through the fan. The inlet cone has a flared inlet

for receiving air, a narrow throat, and a flared outlet for expelling air into the center of a rotating fan wheel. Pressure taps are provided to measure the static pressure at the inlet and the throat. The difference between these pressures, adjusted for the empirically determined characteristics of the inlet cone, can be used as an indication of air flow. In one aspect of the invention, a controller monitors the pressure differential, calculates a flow rate based on the characteristics of the cone, and adjusts the fan speed to maintain a desired air flow.

U.S. Patent No. 5,632,677 (Bates No. CL 912-920), issued on May 27, 1997 to Elkins, is entitled "Fan-equipped Air Delivery Vent" and discloses a fan equipped air delivery vent for installation into a structure in order to enhance the flow of air from a heating/cooling system includes a main housing portion arranged as a generally rectangular box having an air entrance side closest to the heating/cooling system main blower and an air exit side closest to the interior of the room or space which receives the heated or cooled air. Positioned across the air exit side of the main housing portion is a covering register panel which is arranged with two sections of air-flow louvers. Positioned across the air entrance side of the main housing portion is an enclosing panel which has three air-entrance apertures positioned therein. Mounted to the enclosing panel and positioned within the main housing portion are three electric fans which are wired in parallel and controlled by an on-off switch and thermostat. Each of the three electric fans is positioned in alignment with a plurality of louvers on the exit side and with one of the three air-entrance apertures on the inlet side. The enclosing panel and the defined air-entrance apertures ensure that virtually all of the air delivered by the heating and cooling system will flow through the three electric fans and that the fans will conduct relatively clean filtered air. The backflow of dirty air across the tips of the fan blades is restricted by the design of the air delivery vent.

U.S. Patent No. 5,664,995 (Bates Nos. CL 0921-0938), issued on September 9, 1997 to O'Keefe, is entitled "Environmental Enclosure Apparatus with Air Flow Control and Balancing" and discloses an environmental enclosure apparatus provided with air flow control and air balancing. The apparatus includes a housing having a work chamber, multiple adjustable fans for moving air into the work chamber, a filter for filtering particulate from the air moving into the chamber and a control mechanism for controlling each of the multiple adjustable fans. The control mechanism is responsive to a sensor which determines a change in position of at least one component within the work chamber. Air balancing is achieved through the provision of multiple chases within the enclosure, some of which have inlets at a bottom of the enclosure for drawing in external air and some of which have openings internal to the work chamber adjacent to a work surface for facilitating air flow balancing. Preferably, at least some of the chases have controllable dampers and/or controllable draw means coupled to the control mechanism for further facilitating of automatic air flow balancing within the work chamber. Thus, as disclosed in Col. 2, lines 39 through 41 and 50 through 64, multiple adjustable fans are presented, with a control mechanism for the independent operation of the fans based on the observed conditions of multiple variables. The system is optimized to improve energy efficiency.

U.S. Patent No. 5,681,143 (Bates Nos. CL 5094-5103), issued on October 28, 1997 to Ratner, is entitled "Damper Control System for Centrifugal Fan" and discloses a centrifugal fan having a damper control system located away from the air flow path is disclosed. The control system includes a rotatable shaft located outside of a fan housing wherein rotation of the control shaft actuates a plurality of shafts and rods to move an annular damper located within the housing into an open position away from the centrifugal fan blades and to a closed position coaxially over the fan blades thus substantially restricting the flow of air through the centrifugal fan. The dampers

are mounted for translation on two support rods located on opposite sides of the centrifugal fan. The dampers ride on a support system including a plurality of ball bearings that are in tangential contact with the support rods thus providing high-pressure contact surfaces between the bearings and the support shafts which act to keep the path of travel of the bearings on the rods free of debris so that the dampers have unobstructed motion between the open and closed positions.

U.S. Patent No. 5,701,750 (Bates Nos. CL 0939-0952), issued on December 30, 1997 to Ray, is entitled "Zone Demand Controlled Dual Heat Pump System and Controller Therefor" and discloses a thermal zone demand controlled dual cascade arranged heat pump system and system controller for building spaces. The system has first and second heat pumps and has an air circulation system for circulating air to and from said thermal zones. The system further includes a conditioned air chamber having first and second heat exchange refrigerant coils. Thermal zone blowers conduct conditioned air, heated or cooled, from the conditioned air chamber to respective thermal zones of the building space. Electronic controller circuitry of the system is coupled for thermal demand control of the heat pumps and the thermal zone blowers for operation of the first heat pump to accommodate a predetermined range of thermal load and for operation of the second heat pump along with the first heat pump to accommodate a greater thermal load. The controller circuitry also controls selective operation of the thermal zone blowers as well as operation of the thermal zone blowers at low blower speed or high blower speed responsive to sensed conditions of thermal load. The electronic controller circuitry further provides for selective reversal of dual heat pump operation to compensate for unequal operational wear of the heat pump units.

U.S. Patent No. 5,745,041 (Bates Nos. CL 0960-0966), issued on April 28, 1998 to Moss, is entitled "System for Dissipating Heat from a Power Supply" and discloses a system for dissipating heat from a power supply enclosed within a housing having an air inlet and outlet. The system

includes fans disposed in a plenum structure adapted to fit over the housing to thereby establish air communication between the fans and the housing inlet. This way, operation of the fans causes air to flow through the inlet, the power supply, and out through the outlet, thereby dissipating heat from the power supply. Each fan is operable independent of any other of the fans. The relationship between the fans may be serial, parallel, or a combination of serial and parallel. The fans are monitored to detect failure of any of the fans and, upon such detection, an alert is activated. Thus, the multiple fan units are arranged in a plenum and form an array. Col. 3, lines 15 through 18. Independent control of the fan units in the array permits selectively turning them on and off. Col. 3, lines 24 through 35. Should a fan fail, an alert is activated. Col. 3, lines 42 through 45. The fans are sized so that redundancy is built in. Col. 3, lines 50 through 55.

U.S. Patent No. 5,787,971 (Bates Nos. CL 0967-0976), issued on August 4, 1998 to Dodson, is entitled "Multiple Fan Cooling Device" and discloses a cooling device for a computer processor having a heat sink and a plurality of fans. The fans are redundant so that sufficient cooling is supplied should one fan fail. The fans are independently powered and can therefore be independently replaced without shutting down the other fan or the processor. A plurality of fans is mounted substantially within a cavity between fan rows. Each fan blows a flow of air such that the flow impinges on the base plate. A central channel between the front and rear fin rows provides a path for air such that should one fan fail, the other fans are operable. As illustrated, the distance between the fans is small as compared to the overall diameter of the fan blades in a fan unit. Figs. 1, 2, 18 and 19; *cf.* Col. 3, lines 40 through 44.

U.S. Patent No. 5,788,568 (Bates Nos. CL 9582-9594), issued on August 4, 1998 to Ito *et al.*, is entitled "Fan" and discloses a fan array having fan units. Each fan unit has a squarely hollow casing, an electric motor incorporated into the casing and an axial impeller coupled to the motor for

generating an air flow. The casing has one end opened to form the inlet and the opposite end opened to form the nozzles. A guide projects into the casing to arrange the nozzles in a parallel pattern, in a slit shape and in rows. The fan units are coupled together at adjacent sides thereof to be arranged in a row, each unit has the inlet provided with a bellmouth which surrounds the impeller, and a space between each bellmouth and each casing is separated from the air flow. The air flow generated by the impeller is then directed to pass through the space provided thereby.

U.S. Patent No. 5,793,610 (Bates Nos. CL 0977-0986), issued on August 11, 1998 to Schmitt *et al.*, is entitled "Multi-position Air Regulation Device" and discloses a cooling fan system for a chassis configured to contain heat generating electrical components. The chassis is further configured to be positioned either horizontally or vertically. The system includes a support member securable within the chassis and provides an air flow opening formed therein. Additionally, the system includes a louver member attached to the support member configure to rotate between an open position, in which a substantial air flow is allowed through the air flow opening, and a closed position, wherein the louver member covers the air flow opening. The axis of rotation of the louver member is oriented with respect to the chassis to allow gravity to urge the louver member toward the closed position when the chassis is positioned in either the horizontal or vertical alternative operating orientations, to thereby prevent a back-flow of air in the chassis. The reference specifically recognizes the use of multiple fan units in an array and the need to provide a damper to close off the air passageway communicating with a fan unit in the array. The reference also discloses the use of redundancy in arranging the array, so that in the event of failure of an individual fan unit, sufficient cooling capacity is still provided.

U.S. Patent No. 5,800,258 (Bates No. CL 5129-5133), issued on September 1, 1998 to Knoop, *et al.*, is entitled "Ventilation System for Cabinets with Electronic Functional Units which

Produce Considerable Heat" and discloses a ventilation system for a cabinet containing heat-producing components of a data processing system. In a device in which the components are arranged in a stacked relation within the cabinet, four identical fan units for drawing air over the components and discharging the air from the cabinet are provided. The fan units are disposed at mid-height in the cabinet, and are divided into two pairs. The fan units in each pair have their respective air intake directions facing toward each other. The fan units of one pair are disposed directly one above the other, and the fan units of the other pair are disposed a distance apart, forming a horizontal air duct between them. Partitions are disposed in the cabinet for causing the fan units in the first pair to discharge air into the duct formed between the fan units of the other pair, the duct conducting the air to an exterior of the cabinet. The partitions cause the fan units of the other pair to discharge air in a direction out of the cabinet.

U.S. Patent No. 5,949,646 (Bates No. CL 5141-5152), issued on September 7, 1999 to Lee, *et al.*, is entitled "Compact Computer Having a Redundant Air Moving System and Method Thereof" and discloses a computer having a compact enclosure separated into two cooperative spaces defining a single air handling compartment. Each space has a pair of cooling fans, the pairs being arranged on common sides of the spaces. One fan serves as a redundant fan on the failure of one of the other fans. Because the compartments are interconnected on opposite sides relative to the fans by an airflow plenum and separated by an airflow blockage wall in a manner that cooling air introduced into one compartment is circulated through both compartments before being exhausted from the other compartment, the redundancy protection of the system is enhanced. The reference thus discloses a parallel flow fan system of six fans for cooling CPU and memory modules in computers (Figs. 1, 8, elements 16 through 20; Col. 4, lines 65 through 68; claims 1, 7, 8 and 14.

U.S. Patent No. 5,960,638 (Bates Nos. CL 5153-5163), issued on October 5, 1999 to McCabe, *et al.*, is entitled "Modular Environmental Control Unit for Cleanrooms" and discloses a modular environmental control system for small cleanroom enclosures ("mini-enclosures"). Small environmental control units ("ECUs") are mounted on top of individual mini-enclosures, as near as possible to the process tool within the enclosure. Each ECU has the capability of controlling temperature, humidity, and airflow rate delivered into the enclosure. Temperature is adjusted by first cooling the air inside the ECU followed by reheating it to a selected temperature. The cooling capability is not generated by individual ECUs. Instead, a remote fluid cooling unit supplies chilled fluid to each ECU, which is circulated internally to cool the air. The same remote unit services different ECUs at the same time. As described, "[t]he power supply and control of the fan 40 is provided via a conventional VFD controller. Likewise, the power supply and control of the reheat unit 36 is conventional. The control logic used to control fan speed or respectively adjust the heat and vapor output of the reheat unit 36 and humidifier 44 is conventional and would be easy to implement by those skilled in the art." Col. 5, lines 34 through 41.

U.S. Patent No. 5,999,403 (Bates No. CL 5164-5170), issued on December 7, 1999 to Neustadt, is entitled "Frame Rack with Module Carriers and a Ventilating Installation" and discloses a cabinet for telecommunications engineering. A frame rack containing at least one module carrier is designed to receive plug-in units, and a ventilating installation for cooling the plug-in units is provided. The ventilating installation comprises at least one fan insert with several vertically blowing axial fans, which can be plugged in and integrated into the module carrier. The fan insert is located under transverse supports of the module carrier and has at least one plug connector at the rear, which makes contact with a secondary plug connector provided on the rear wiring panel.

U.S. Patent No. 6,011,689 (Bates No. CL 5171-5183), issued on January 4, 2000 to Wrycraft, is entitled "Computer Component Cooling Fan Closure Device and Method Thereof" and discloses a cooling system for a computer. Should one of the fans fail, vanes will close to prevent backdraft, thereby constituting backdraft dampers for use in an array of fans so that the efficiency of the array is enhanced should an individual fan unit stop operating. The vanes have hinged slats to allow them to fall downwardly by their own weight or by additional assistance. The vanes are kept open by the airflow created by the fans. Upon the failure of a fan, the absence of airflow through the opening thereof allows the slats of the vane to drop, thereby closing off the fan opening and prevent airflow into the fan opening from its outlet side. The reference thus discloses an array of six fans. Fig. 7, element 43; Col. 4, lines 35 through 36. *See also* claims 3 and 9.

U.S. Patent No. 6,031,717 (Bates Nos. CL 0987-0998), issued on February 29, 2000 to Baddour *et al.*, is entitled "Back Flow Limiting Device for Failed Redundant Parallel Fan" and discloses a plurality of parallel fans mounted for moving side-by-side columns of air in a chassis. A louver member is provided adjacent each fan. Each louver member is deformable from a closed position to an open position by a flow of air generated by its respective fan. Each louver member is also deformable to a closed position, to engage a portion of an air passageway, if a respective fan should fail. Thus, a fan array contemplating the parallel placement of fans, in which some may be off while others are on, is provided. The reference specifically teaches the "use [of] an 'N+1' strategy" to provide more than enough fans to accommodate the demand required of them. Col. 1, lines 12 through 19.

U.S. Patent No. 6,050,774 (Bates Nos. CL 5196-5201), issued on April 18, 2000 to LeBaron, is entitled "Modular Filter Fan Unit" and discloses a modular fan filter unit designed to supply process control air to mini-enclosure clean rooms. The modular fan filter unit is easy to

remove, repair, and replace in the clean room environment. It has a readily accessible filter mounted across its bottom surface and an internal variable frequency drive fan. The fan pushes air through the filter into a clean room. Multiple numbers of modular fan filter units may be connected together as an array. Thus, the fan unit described is modular and constructed to be arranged in an array. A housing surrounds the fan assembly and the unit is mounted on a grid. A distribution box is provided to distribute power and provide connections for control signals. Col. 3, lines 32 through 34. "The control signal can be directed to a VFD control 50 for the fan 18 within a given unit 10." Col. 3, lines 53 through 54. "As discussed above, the power distribution box 44 can provide a control signal to the VFD control 50. In this way an external control signal can be provided to each modular unit 10 to precisely adjust the volumetric flow rate from each modular unit." Col. 3, line 65 through Col. 4, line 6.

U.S. Patent No. 6,072,397 (Bates Nos. CL 0999-1009), issued on June 6, 2000 to Ostrowski, is entitled "Method and Apparatus for Reducing Flame Emissions from an Electronics Enclosure" and discloses a method and apparatus which reduces flame emissions from an electronics enclosure in the event of a fire within the enclosure. At least one fan is utilized to provide air flow along an air flow path between an air intake port and an air exhaust port of the enclosure. At least one heat sensor, such as a linear heat detector cable, detects an overheated temperature condition within air flow path when the temperature in the air flow path exceeds a predetermined threshold temperature. The sensors are coupled to a fan controller. In response to the detection by the controller of the overheated condition indicated by one or multiple sensors disposed within the air flow path, the fans are disabled to avoid the fanning of flames within the enclosure and the exhaust of flames from the enclosure. The controller may also activate a indicator such as an a alarm or warning light to make a user aware of the overheated condition and additionally may provide an electronic signal

indicative of the overheated condition to system hardware or software to permit further alert messages to be provided.

U.S. Patent No. 6,104,608 (Bates No. CL 5202-5213), issued on August 15, 2000 to Casinelli, *et al.*, is entitled "Noise Reduction Hood for an Electronic System Enclosure" and discloses a noise reduction hood for attenuating the acoustic noise of cooling fans emanating from an electronic enclosure. The hood is comprised of a base that is constructed and arranged to be supported on the enclosure. The base has an air duct that is adapted to pass air through it in a first direction, and includes at least one noise reduction panel disposed in the air duct to attenuate acoustic noise emanating from the enclosure. In one embodiment, the noise reduction panel divides the air duct into a plurality of acoustical flow passages extending through the base. In another embodiment, the hood includes a cover, which may be detachable, that is adapted to divert the air from the first direction to a second direction. In a further embodiment, the hood includes a rim extending from the base for surrounding a portion of the enclosure to secure the hood to the enclosure. The hood may include a plurality of interlocking panels that are arranged in a grid pattern to form an array of acoustical flow passages. The reference thus teaches the use of individual sound absorbing chambers that surround the outlet side of each individual fan in an array of fans. Fig. 1.

U.S. Patent No. 6,257,832 (Bates Nos. CL 1020-1028), issued on July 10, 2001 to Lyszkowski *et al.*, is entitled "Multiple Fan System Having Means for Reducing Beat Frequency Oscillations" and discloses a multiple fan system including at least two simultaneously operated fans. Each of the fans is operable as a constant speed fan and as an oscillating speed fan. Not more than one of the fans is operated as a constant speed fan. Each fan not being operated as a constant speed fan is operated as an oscillating speed fan. A fan controller operates each oscillating speed

fan in a mode whereby a respective acoustic emission having a range of frequency different than any other oscillating speed fans is produced. Thus, the perceived noise generated by the fan cluster is minimized. Figs. 3, 5; *see also* Abstract.

U.S. Patent No. 6,351,920 (Bates Nos. CL 5232-5241), issued on March 5, 2002 to Hopkins, *et al.*, is entitled "Ceiling Module Perimeter Seal" and discloses a ceiling module perimeter seal establishing an air-tight seal between modules forming a ceiling structure. The seal includes a groove about the perimeter of modules and aligned relative to a corresponding groove of an adjoining module. Aligned grooves in adjacent ceiling modules establish an enclosure between modules and apertures fluidly couple the enclosure with gel sealant troughs of the ceiling structure. Gel sealant flowing in the troughs enters the enclosure and thereby establishes an air tight seal between adjoining ceiling modules.

U.S. Patent No. 6,368,064 (Bates No. CL 5242-5249), issued on August 9, 2002 to Bendikas, *et al.*, is entitled "Apparatus and Method of Providing Redundant Power and Redundant Fan Speed Control to a Plurality of Fans" and discloses an apparatus and method for providing redundant power and redundant fan speed control to a plurality of fans. A first power supply input is electrically connected to a second power supply input to provide a combined power supply input. First and second fan speed controllers each having an input and an output are provided, along with first and second power converters each having an input and an output. The combined power supply input is electrically connected to the input of the first fan speed controller and the input of the first power converter. The combined power supply input is also electrically connected to the input of the second fan speed controller and the input of the second power converter. The output of the first fan speed controller is electrically combined with the output of the second fan speed controller to provide a combined fan speed control signal. The combined fan speed control signal is electrically

connected to the plurality of fans. The output of the first power converter is electrically combined with the output of the second power converter to provide a combined fan voltage. The combined fan voltage is electrically connected to the plurality of fans. The reference thus discloses an array of eight fans incorporating a combined fan speed controller with PWM drivers for providing speed control signals and combined power converter for fan voltage. Fig. 3, elements 152 and 153; Col. 4, lines 24 through 76; claims 1, 8 and 10.

U.S. Patent No. 6,374,623 (Bates No. CL 5250-5255), issued on April 23, 2002 to Gubbels, is entitled "Stable Providing [sic] with a Climate Control System, and also a Method For Controlling the Climate in Such a Stable" and discloses a stable in which one or more fans are mounted in the walls. The stable roof includes means for exhausting spent air. The spent air is used to control the temperature of the air to be supplied. The fans supply conditioned air essentially at floor level, wherein the amount of air to be supplied and the temperature thereof can be controlled for each fan individually.

U.S. Patent No. 6,379,111 (Bates No. CL 5256-5266), issued on April 30, 2002 to Katoh, *et al.*, is entitled "High Volume Ventilation Fan with Noise Attenuation for Personal Computer" and discloses a ventilation fan for a PC. The fan has a plurality of blades disposed around a rotary hub. Each blade is shaped differently from the others to an extent that the air volume handling capacity of the blades is not substantially diminished. The noise level generated by a fan in a specific frequency range is caused by the change in air pressure and is attributable to the symmetry of the fan blade shapes. By altering the shape of the individual blades, the noise level due to pressure change is attenuated. Each blade slightly differs in shape from the others to eliminate air pressure changes. The noise level of the fan is suppressed within an allowable range even when the number of blades and the rotational speed of the fan are increased for better air flow. Preferably, the shape

of each blade is varied from the others by putting an adhesive such as putty on the front surface and/or the back surface thereof near the hub. In addition, by putting an adhesive or putty on the front surface and/or the back surface of the blade entirely, the shape of the blade is varied from the others.

U.S. Patent No. 6,386,826 (Bates Nos. CL 1029-1042), issued on May 14, 2002 to Jacob, is entitled "Fan with Self Closing Blades" and discloses a fan system to be mounted over an opening including a plurality of pivoting blades. The pivoting blades are fixed on a freely-wheeling element and a motor-driven element. In operation, when the fan is on, the motor-driven element pivots the blades to a blowing position, thereby permitting air flow through the opening. When the fan is off, a resilient member pivots the blades to a closed position, preventing air flow through the opening. Thus, a damper assembly is shown to prevent backdraft in a fan array when an individual fan unit in the array is off.

U.S. Patent No. 6,396,688 (Bates No. CL 5267-5276), issued on May 28, 2002 to Davies, *et al.*, is entitled "Series Fan Speed Control System" and discloses a redundant fan system having an in-series configuration of adjustable speed fans. A speed controller coupled to the fan system includes a first fan operated at a constant operating speed and a second fan operated at an adjusted operating speed to maintain a speed differential between the first and second fan speeds. A sensing device is connected to the first and second fans and to the speed controller for maintaining the speed differential constant.

U.S. Patent No. 6,463,891 (Bates Nos. CL 1122-1137), issued on October 15, 2002 to Algrain *et al.*, is entitled "Twin Fan Control System and Method" and discloses a control system and method for controlling the speed of multiple fans for cooling fluids in accordance with the heat dissipation requirements of the particular heat transfer cores. A plurality of sensors positioned to

sense the temperature of each of the fluids is provided, each sensor being operable to generate a signal to indicate the temperature of the respective fluid. A controller coupled to the sensors receives signals indicative of the temperature of each of the plurality of fluids, determines therefrom a desired fan speed for each fan, and outputs a signal to individually control the speed of each fan. Each output signal is based upon a comparison of at least some of the temperature error signals determined from the plurality of sensor signals. Thus, speed control of individual fans is shown. Col. 2, lines 55 through 62, Col. 3, lines 10 through 14. The use of multiple fans is recognized as a way to "conserve space, improve cooling effectiveness, and reduce noise." Col. 4, lines 8 through 10.

U.S. Patent No. 6,481,635 (Bates Nos. CL 5286-5298), issued on November 19, 2002 to Riley, *et al.*, is entitled "Environmental Control Method" and discloses a method and system for controlling the environment of storage facilities. Movement of air within the facility is accomplished by air-handling units. The speed of each fan is controlled by a variable-speed drive, allowing the fans to run at speeds below full capacity. Environmental parameters, such as temperature or humidity, are monitored to determine the existing state of the environment which is then compared to a desired state. The speed of the fans or air-handling units is adjusted to alter the existing environmental state, bringing it in alignment with the desired state. The fans or air-handling units are operated continuously, typically at reduced capacity. Other various facets are included with the system and method, including the control of the admittance of external air into the storage facility.

U.S. Patent No. 6,491,502 (Bates No. CL 5299-5313), issued on December 10, 2002 to Hunt, is entitled "Center Mounted Fan Module with Even Airflow Distribution Features" and discloses a fan shroud structure including a shroud body having a pair of opposing first sides and a

pair opposing second sides. The first sides are joined with the second sides at corners so as to form a box-like configuration defining an interior space. The shroud body has a front end constructed and arranged to be disposed adjacent to a condenser and a back end constructed and arranged to be disposed adjacent to a radiator. A generally annular wall structure is within the interior space and is constructed and arranged to receive blades of a fan within bounds thereof. Vortex preventing structure is provided in each corner near the back end. The vortex preventing structure is constructed and arranged to prevent large scale eddy current generation of air in the corners as air enters the radiator. Air deflecting structure is provided in each corner near the front end. The air deflecting structure is constructed and arranged to deflect incoming air towards the sides, thereby reducing air drawn by the fan from the corners.

U.S. Patent No. 6,522,539 (Bates No. CL 5314-5333), issued on February 18, 2003 to Ota, *et al.*, is entitled "Cooling Method and Apparatus for an Electric Device" and discloses a cooling apparatus. A fan box is provided with a plurality of intake openings and exhaust openings formed on a intake surface and an exhaust surface in opposite relation. A plurality of fan units each have a multi-blade fan and a intake duct alternately arranged in an axial direction of the multi-blade fan. As shown in Fig. 15, a fan array with at least six fans is shown, wherein each fan is provided with a backdraft damper. Size reduction with fan arrays is taught. Col. 1, lines 65 through 67. Individual control of the fans is facilitated, as well. *See, e.g.*, Col. 6, lines 49 through 53.

U.S. Patent No. 6,554,697 (Bates No. CL 5334-5354), issued on April 29, 2003 to Koplin, is entitled "Computer Cabinet Design" and discloses a computer cabinet cooled by locating the cabinets on tiles of an elevated floor. Cool air is provided under the tiles. The cabinet has variable size openings in the bottom surface located over openings in the tiles. Openings in the top surface of the cabinet, which openings may have fans located in the openings, highly perforated shelves and

a highly perforated front door are provided. By controlling the size of the various openings, and the number, if any, of fans and air flow through the door the temperature in the cabinet may be controlled. A number of cabinets may be located side-by-side with side walls in contact and with wires introduced into one cabinet from under the tiles through an opening in its bottom wall being passed from cabinet-to-cabinet through aligned openings in the side walls of the cabinets. The air flow within the cabinets may be reversed in air conditioned rooms not having cooling air under the floor on which the cabinet is situated. The reference thus discloses an array of six fans for cooling a cabinet containing heat producing elements by integrating cabinet cooling into raised floor or overhead cooling system into the enclosure with highly perforated door and device for controlling air flow through door. *See* Fig. 5, element 24; Fig. 16; *see also* Col. 9, line 17 and claims 12 and 14.

U.S. Patent No. 6,554,698 (Bates No. CL 5355-5359), issued on April 29, 2003 to Kranzdorf, *et al.*, is entitled "Fan One Way Air Valve" and discloses a valve for a vent. The valve includes an inner leaf having a closed state which covers the vent and blocks gas flow through the vent in a first direction, and an open state which opens the vent and allows gas flow through the vent in a second direction. The valve includes an outer leaf opposing the inner leaf. By moving an inner leaf and an outer leaf opposing the inner leaf on the vent from a closed state, which covers the vent and blocks gas flow through the vent in a first direction, to an open state, which opens the vent and allows gas flow through the vent in a second direction, a method of control is provided. Fig. 1 shows an array of four fans, each provided with individual backdraft dampers.

U.S. Patent No. 6,590,768 (Bates No. CL 5360-5371), issued on July 8, 2003 to Wiley, is entitled "Ventilating Slide Rail Mount" and discloses a chassis slide assembly comprised of a mating rail and track that telescopically engage with one another and that are adapted for coupling to a chassis and to a rack to allow the chassis to be pulled out from the rack for inspection, service

or repair. The rail and track each have at least one air flow aperture positioned to allow unobstructed venting of air through the slide assembly and through the side wall of the chassis. In one embodiment, the rail and track have a plurality of airflow apertures. The apertures of the rail and track can consist of a large-area openings, or of a plurality of slots or perforations. In one embodiment, the apertures of the rail are substantially aligned with the apertures of the track, *e.g.* when the rail and track are fully engaged with one another. An advantage of the present invention is that the additional air flow apertures in the chassis slide provide improved air flow throughout the chassis, thereby reducing the possibility of overheating and component failure. The reference thus discloses a slide rail mount apparatus for ventilating data processors with telescoping rail and track to slide chassis into and out of rack and providing an air flow aperture for passage of air through chassis slide from the fan pack (Fig. 1, Col. 5, line 55 to Col. 6, line 10).

U.S. Patent No. 6,594,148 (Bates No. CL 5384-5395), issued on July 15, 2003 to Nguyen, *et al.*, is entitled "Airflow System" and discloses a multi-directional airflow system for telecommunications equipment. The equipment housing defines an internal cavity which can be divided into a plurality of air flow channels. Each air flow channel captures a sub-portion of the overall airflow volume provided by the internal cavity. The smaller volume flow channels provide a smaller cross-sectional area through which the majority of air travels. Since the cross-sectional area is smaller, the velocity of the air through the flow channels is increased. Since the air velocity is increased, the heat transfer coefficient is also increased, thus allowing for the more efficient removal of heat. A set of fan trays can include a plurality of fans each directionally positioned to work in series to cause air to flow through the plurality of flow channels. The reference thus discloses an airflow system with at least six fans arrayed for cooling a housing with two fan trays

configured to cause air to flow through two flow channels, one following the other, positioned at one end of the housing. Figs. 1 through 3, element 72; Col. 4, lines 16 through 20; claim 7.

U.S. Patent No. 6,648,590 (Bates Nos. CL 1138-1142), issued on November 18, 2003 to Huang *et al.*, is entitled "Parallel Fan" and discloses a parallel fan including an integrally formed fan frame having plural pairs of locating windows and a plurality of fans. The fans are mounted in plural pairs of locating windows. The parallel fan has an external single pair of power lines. Each pair of locating windows includes an inlet and an outlet for respectively enabling the fan to draw air in from the inlet and discharge air to the outlet. As shown, three fans are arranged independently and show power separately provided to each, thereby permitting independent operation of the individual fan units.

U.S. Patent No. 6,657,858 (Bates No. CL 5396-5429), issued on December 2, 2003 to Rothschild, is entitled "Housing for Data Storage Devices or for Accommodating Such Devices" and discloses a device including a housing of motorized driven data storage devices having one or more drive assemblies. The drive assemblies have data storage media and drive motors. Together with fastening means, a damper carrier surface, a damper fastening surface, at least one respective carrier surface oscillation damper and a fastening surface oscillation damper is provided to support a data storage device. The damper carrier surface and the damper fastening surface are allocated to one side of the drive assembly and to two opposite facing sides of a suitable supporting surface. A carrier surface oscillation damper is arranged between the damper carrier surface and the supporting surface and is situated with at least one respective contact surface on the damper carrier surface and the supporting surface in at least a partially two-dimensional manner. In addition a fastening surface oscillation damper is arranged between the damper fastening surface and the supporting

surface and is situated with at least one respective contact surface on the damper fastening surface and the supporting surface in at least a partially two-dimensional manner.

U.S. Patent No. 6,675,739 (Bates Nos. CL 1143-1155), issued on January 13, 2004 to Terrell *et al.*, is entitled "Livestock Cooling System" and discloses a system for conditioning the air provided to animals in a barn. Cooling fans are connected to programmable oscillation means, enabling the operator to program fan oscillation according to the location of the livestock. The system is programmable according to various environmental conditions, including temperature, humidity, and wind velocity. The system provides a cool and healthy environment for livestock, where the environment is programmed to track the animals according to the time of day and the location of shade. At Col. 3, lines 30 through 33, independent control of the fans is recited. *See also* Col. 4, lines 1 through 6.

U.S. Patent No. 6,791,836 (Bates Nos. CL 9595-9606), issued on September 14, 2004 to Cipolla *et al.*, is entitled "Smart Fan Modules and System" and discloses a fan module including two or more individual fans, each fan having an air movement means and a motor engaged with the air movement means for accelerating air entering each of the two or more individual fans; a temperature sensor for sensing a temperature associated with the two or more fans and for outputting a first signal corresponding to the temperature; rotational speed sensor for outputting a second signal corresponding to a rotational speed of each of the two or more fans; and a processor for receiving the first and second signals and controlling the two or more individual fans based on the first and second signals. Fig. 3 shows as many as ten fans. Individual speed control of the fan units is shown at Col. 2, lines 1 through 13. The fans in the array are individually controlled to control temperature. Col. 2, lines 14 through 22.

U.S. Patent No. 6,792,766 (Bates Nos. CL 1156-1191), issued on September 21, 2004 to Osborne *et al.*, is entitled "Zone Demand Controlled Dual Air Conditioning System and Controller Therefor" and discloses a thermal zone, demand-controlled air conditioning fan coil unit using dual cascade arranged heat pumps. Chilled water, or a combination of chilled water and hot water, with or without back up electric resistance heat strips, and having an air circulation system for circulating air to and from a plurality of thermal zones and including a conditioned air chamber having first and second heat exchange refrigerant coils or direct or reversed cycle water coils being connected in refrigerant circulating relation respectively with the heat pumps, chilled water coil. A plurality of thermal zone blowers conduct conditioned air from the conditioned air chamber to respective thermal zones of a building space. Electronic controller circuitry of the system is coupled for thermal demand control of the heat pumps and the thermal zone blowers for operation of the first heat pump during average thermal load and for operation of both heat pumps during greater thermal load. For chilled or hot water systems, the controller controls operation of thermal zone blowers and motorized valves which control the flow of water to and from the water coils. The electronic controller circuitry further provides thermostat control circuitry having set point change capability at any of the thermal zone thermostats and periodically reverses heat pump operation to compensate for uneven wear. The reference thus discloses an air-handling unit connected to a structure with an array of eight fans. Fig. 10. Selective control of fans by on/off means is shown. Col. 4, line 56 through Col. 5, line 5. Individual speed control of the fan units is shown, as well. *Id.*

U.S. Patent No. 6,813,152 (Bates No. CL 5470-5480), issued on November 2, 2004 to Perazzo, is entitled "Method for Improving Airflow in Subrack Mechanics by Using a Hybrid Serial/parallel Fan Configuration." This reference discloses an improved fan module for use in an electronic enclosure. The fans are arranged in a hybrid serial parallel configuration which provides

both redundant flow of successive fans and the ability to flow around a failed or locked fan to continue airflow. The fans are further arranged in an angled configuration to provide airflow through the enclosure without the need for baffles or other thermodynamic steering devices.

U.S. Patent No. 6,814,546 (Bates No. CL 5481-5511), issued on November 9, 2004 to Sekiguchi, is entitled "Multifan-equipped Apparatus for Cooling Objects Mounted at Local Interior Regions and Provided with Fan-unit Assembly and Operation Monitoring Means Having an Error Detector." This reference discloses multiple fan arrays for cooling a compartment, and indicates control of the fan units in the arrays is arranged to save energy. One fan unit in each array is a master fan unit that is automatically adjustable in revolutions per minute (rpm) in accordance with a temperature reading and serves to control the rpm of at least one of the remaining fan units in the same group. Consequently, the rpm is adjusted to a first estimated value corresponding to the automatically adjusted rpm of the master fan unit. A controller is constructed to detect failure of a fan unit within an array, and the rpm of the master fan unit of the array is set to a second estimated value. This provides back-up control, minimizing loss of cooling performance of the fan array in the event of failure of a fan unit. The reference thus discloses a multi-fan unit assembly for electronic devices with a master fan that automatically adjusts its rotation per minute based on environment temperature and unit for monitoring operation of every fan in each group. Fig. 1, element 5, *see* Abstract; Col. 4, lines 9 through 33, Col. 5, line 1 through Col. 6, line 9. *See also* the claimed controllers in claims 1 and 13.

U.S. Patent No. 6,826,456 (Bates No. CL 5512-5530), issued on November 30, 2004 to Irving, *et al.*, is entitled "System and Method for Controlling Server Chassis Cooling Fans" and discloses a system for controlling server chassis cooling fans. Figs. 1 and 2 show an array of at least 6 fans connected to a common enclosure. The system includes monitoring operating temperatures

associated with each of a plurality of temperature sensors. The temperature sensors may be coupled with a plurality of respective server processing cards. In one embodiment, the operating speed of each of a plurality of server chassis cooling fans coupled with a server chassis is increased, in response to an operating temperature exceeding a predetermined maximum operating temperature measured at any one of the plurality of temperature sensors. Col. 1, lines 45 through 54. Alternatively, in another embodiment, the operating speed of each of the plurality of server chassis cooling fans is decreased in response to an operating temperature below a predetermined minimum operating temperature measured at each of the plurality of temperature sensors. In still another embodiment, a fan shutdown timer is activated for a predetermined time period at each of the plurality of server processing cards having an operating temperature below the predetermined maximum operating temperature. Thus, the reference discloses server chassis cooling fan control method for server processing cards and six cooling fans within server chassis that controls fan speed based on operating temperatures (Figs. 1 and 4, elements 56 through 61; Col. 4, line 15; claims 1 and 9 through 12). Fig. 9 explains how the system works to conserve energy by controlling the array of fans to ensure that they are not providing more air circulation than necessary, thereby conserving energy. Note that, at Col. 11, lines 17 through 23, independent control of individual fan units in the array can be provided, permitting individual on-off operation of fans and permitting individual speed control of individual fan units.

U.S. Patent No. 6,932,696 (Bates No. CL 5531-5539), issued on August 23, 2005 to Schwartz, *et al.*, is entitled "Cooling System Including Redundant Fan Controllers" and discloses a cooling system including redundant fan controllers. The cooling system includes a first fan controller coupled to control a first plurality of fans and a second fan controller coupled to control a second plurality of fans. During operation, the first plurality of fans and the second plurality of fans

operate concurrently. The first fan controller and the second fan controller are each configured to monitor the first and the second plurality of fans and to detect a failure in any of the first and the second plurality of fans. Further, in response to detecting a failure of a fan of the first plurality of fans, the second fan controller is configured to increase an operating speed of a corresponding fan of the second plurality of fans. The reference thus discloses a cooling system with a fan controller system configured to work with more than one fan array, configured to increase the operating speed of a fan unit in one fan array when it detects failure of a corresponding fan in a second fan array. Fig. 1, elements 60A and 60B; Figs. 3 and 4. *See also* Col. 2, lines 26 through 30; claims 1 and 5.

U.S. Patent No. 6,961,248 (Bates No. CL 5540-5549), issued on November 1, 2005 to Vincent, *et al.*, is entitled "Electronics Assembly" and discloses a chassis for an electronics assembly having a frame configured to receive a plurality of cooling fans. Individual fans are removable. The chassis thus allows replacement of any fans without the assembly being shut down, and also reduces downtime of the assembly if all the fans need replacing, for example for maintenance. The reference thus discloses eight fans in an electronic assembly chassis with a panel located on face of frame and a holder for fans that allows removal of individual fans from panel and replacement of any fan while panel is located on frame. Fig. 1, element 22; Col. 5, lines 5 through 61. *See also* claims 1, 8 and 13.

U.S. Patent No. 6,988,868 (Bates No. CL 5550-5569), issued on January 24, 2006 to Ashworth, is entitled "Propulsion Linearizing Mechanism" and discloses a propulsion linearizing mechanism for linearizing a fluid flow. The mechanism includes a frame having a cylindrical outer baffle which rotatably supports a plurality of propeller elements. Each propeller element defines a respective sweep area as the propeller element is rotated which overlaps sweep areas of adjacent propeller elements. The outer baffle circumscribes an outer periphery of the collective sweep areas

of the respective propeller elements. The propeller elements rotate in the same direction whereby forces of curvature flow of adjacent propeller elements substantially cancel one another to linearize fluid flow through the mechanism. Additional baffles and infills within the areas of non blade sweep may be provided for particular applications of the mechanism. In various applications, linear forces of vector flow are formed by integrating curvature forces of tangential flow and economy flow systems are established to increase force potentials on the planes of rotating propellers to provide the emission and induction flow with an insulation whereby fluid in the immediate vicinity of the mobile flow remains in an undisturbed static state. This allows a fluid propulsion assembly to be fitted with an outer utility mantle in the static zone of the field.

U.S. Patent No. 7,154,748 (Bates No. CL 5570-5599), issued on December 26, 2006 to Yamada, is entitled "Cooling Structure of Electronic Equipment and Information Processing Equipment Using the Cooling Structure" and discloses a cooling structure for electronic equipment. The cooling structure has a substrate housing, an upstream side duct, a downstream side duct, an exhaust and an air adjuster. The substrate housing detachably houses one or more substrate units, and the downstream side duct communicates cooling air from the upstream side duct through the substrate housing. The exhaust is provided at an exhaust port to forcibly discharge air to the outside, thereby allowing the cooling air to flow to the substrate housing. The air adjuster adjusts the volume for cooling air which flows to the downstream side duct.

U.S. Patent Application No. 2004/0028522 (Bates No. CL 4714-4722), published on February 12, 2004 on behalf of Lin, *et al.*, is entitled "Modular Fan Assembly" and discloses a modular fan assembly. The fan assembly is mounted in an electronic device having a frame defining an opening for air circulation. At least two spaced apart fans are disposed within the frame. Each fan has a stator and blades attached to the stator, and a divider disposed between the

fans for partial separation. An outer end of the divider is smaller than a depth of the frame, thereby leaving a distance between the outer end of the divider and an outer surface of the frame so that an area of the opening for an escape of air from the fans is increased for effectively reducing a resistance of air flow and obtaining a maximum draft by means of the divider.

U.S. Patent Application No. 2004/0032722 (Bates No. CL 4723-4734), published on February 19, 2004 on behalf of Wrycraft, *et al.*, is entitled "Electronics Module" and discloses an electronics module having a housing and a plurality of fans. The module includes electromagnetic shielding, for example, perforated panels, side walls, etc. associated with the housing and/or the electronic components. These provide a Faraday cage for the electronic components. The shielding is constructed so that one or more of the components can be removed from the module while the module is in operation without affecting the integrity of the Faraday cage. The module enables components to be replaced without turning the unit off or increasing electromagnetic interference. The reference thus discloses an eight fan array cooling an electronic computer housing that allows one or more electronic components to be removed during operation. Figs. 1 and 3, elements 22 and 26 ; Figs. 5 and 6. *See also* Paragraphs 040 and 045; claims 4 and 6.

Foreign Patent/Publication References

British Patent No. GB 2 334 756 (Bates No. CL 4621-4641), published on September 1, 1999 on behalf of Bryant, *et al.*, is entitled "Fan Unit with Two Fans, Guide Vanes and Tapering Duct" and discloses two centrifugal or mixed-flow fans mounted in series within a common housing. The fans drive air through the housing from an inlet to an exhaust. A tapered duct within the housing reduces the gas flow cross-sectional area from the exhaust of the upstream fan to the inlet of the downstream fan. Several guide vanes extend radially inwards from the tapered duct to

reduce rotational flow of air within the duct. The inlet to the guide vanes is angled to improve the exhaust flow from the fan. The fans are substantially identical and driven independently by substantially identical electrical motors. Only one fan is driven at any time and the non-driven fan windmills due to the air flow thus forced through it. The air flow through the housing is substantially the same whichever fan is driven (Fig. 7).

EP 0205979 (Bates Nos. CL 0953-0959), published October 12, 1988 on behalf of Mizutani, *et al.*, is entitled "Tunnel Ventilating System" and discloses a multi-fan air handling apparatus having a control to turn selective fans on and off to optimize the airflow desired. The reference thus discloses a fan array, here as arranged in a tunnel, having a multi-fan controller for selectively turning the fan units in the array on and off. Col. 1, lines 58 through 63 and Col. 2, lines 18 through 25. Multiple fans are desired so as to not excessively ventilate the tunnel, which is undesirable "from the economic point of view …." Col. 2, lines 9 through 10. Control of the fan array is provided and comprises receiving data reflecting multiple data, such as from "CO sensors, anemoscopes, anemometers, O_2 meters and hygrometers." Col. 2, lines 57 through 62.

EP 0004448 (CL 4605-4620), published on October 3, 1979 on behalf of Beard, discloses a method and apparatus for controlling a stationary fan-cooled cooling system using a fan array. The reference discloses the use of multiple fans arranged in an array in circumstances where a large volume of air must be moved, as an energy-saving improvement over the use of a single fan which would waste power except under conditions of high load. Page 2, lines 16 through 19. Thus, fans are selectively turned on or off to achieve energy savings by a controller. Page 2, line 24 through page 3, line 1. As many as eight fans are specifically recited in the fan array. Page 8, lines 11 through 13. Moreover, the fans can be independently controlled for speed. Page 8, lines 25 through 27.

Japanese Patent Publication No. 03225140 (Bates No. CL 4642-4645), published on October 4, 1991 on behalf of Tsutsui Toshinao, *et al.*, is entitled "Whirlwind Generating Apparatus" and discloses a control mechanism for coordinating the operation of a plurality of fan units to achieve a desired airflow.

Japanese Publication Laid Open No. 47,200/1992 (Bates Nos. H 1607-1611) discloses a fan unit for a clean room.

Japanese Publication Laid Open No. 53,138/1992 (Bates Nos. H 1612-1615) discloses an apparatus for supplying conditioned air into a clean room.

Japanese Patent Publication No. 11132489 (Bates Nos. H 1627-1629 and 1648-58) discloses a multifan apparatus for use in air handling systems constructed to reduce the initial cost of construction and the cost of operation.

Japanese Patent Publication No. 11211164 (Bates Nos. H 1602-1606 and 1673-1711) discloses a blower unit for air cleaning.

Japanese Patent Publication No. 8089747 (Bates Nos. H 1616-1618 and 1712-31) discloses a clean room system.

Japanese Patent Publication No. 8114342 (Bates Nos. H 1598-1601 and 1659-72) discloses an air handling system and control therefor for a cleanroom.

Japanese Patent Publication No. 8261531 (Bates Nos. H 1619-1623 and 1732-50) discloses a control system for a clean room constructed to improve fan motor efficiency.

Japanese Patent Publication No. 9010534 (Bates Nos. H 1624-1626 and 1751-75) discloses an array of fan units constructed and arranged for use in a clean room.

Other References

The AAON worksheet and drawing regarding Borders East Towers job for customer Borders Group, dated Feb. 26, 2001 and Feb. 6, 2001 (2 pages) (Bates Nos. CL 0295-0296). This reference discloses a worksheet and drawing by AAON, Inc. in Tulsa, Oklahoma that was prepared for its customer, Borders Group, Inc. under the job name of Borders East Towers. The worksheet is dated February 26, 2001 and the drawing is dated February 6, 2001. This reference shows 1) the use of multiple plenum fans, i.e. four fans; 2) an airway path of less than 72 inches; and spacing between fan units that is less than 60% of the fan wheel diameter.

AAON order form, estimating worksheet, and facsimile transmission regarding The Commons job, dated Sep. 15, 1998, Sep. 30, 1998 and Jun. 30, 1998 (3 pages) (Bates Nos. CL 0297-0299). This reference discloses an order form, estimating worksheet, and facsimile transmission from AAON to its customer, Bovis Construction Company under the job name of The Commons. The order form is dated September 15, 1998, the estimating worksheet is dated September 30, 1998, and the facsimile is dated June 30, 1998. Each sheet of this reference shows that this job would include perforated liners or "perf. liners." These perforated liners are acoustically absorptive insulation surface provided on the fan unit chamber.

AAON RL Feature Master Number sheet, dated Oct. 17, 2001 (1 page) (Bates Nos. CL 0303). This reference discloses an AAON document entitled RL Feature Master-Feature Number showing different options available to customers from AAON. The reference is shown with an update date of October 17, 2001. Under "1st Feature – Return Outside Air Options," the B Feature-R/A Blower Config., options E, F, and G show fans that can be operated independently with separate variable frequency drives (VFDs).

AAON wiring diagram assignment and verification regarding Farm Show Arena job, Apr. 1, 2002 (1 page) (Bates Nos. CL 0300). This reference discloses a wiring diagram assignment and verification by AAON for its customer Frey Lutz Corporation under the job name Farm Show Arena. Although the reference is dated April 1, 2002, it indicates a lead date of December 27, 2001 for the job. This reference shows use of backdraft dampers with fan units.

AAON worksheet and drawing regarding Harrison Hills job, both dated Feb. 26, 2002 (2 pages) (Bates Nos. CL 0301-0302). This reference discloses a worksheet and associated drawing by AAON for its customer Jacco Associates under job name Harrison Hills. The worksheet is dated February 26, 2002 and the drawing is dated February 26, 2002. The reference shows a blow-through design where the air handling system conditions the air within the unit and the fans push the air through the unit.

AAON, Invoice No. 265184, February 28, 2002 (Bates Nos. CL 0339).

AAON, Order Form and Associated Documents, Nov. 14, 2001 (Bates Nos. CL 0340-0347).

AAON, RL Series 45 to 230 tons Packaged Rooftop Conditioners & Air Handlers (Bates Nos. CL 0596-0660).

AAON, RL Series Rooftop Conditioners, Sep. 2001 (Bates Nos. CL 0662).

AAON, Jim Parro (Marketing Manager for AAON) New Promotional Literature The RL Series (Bates Nos. CL 0338).

Governair Case Study for TopLine Package Units, Hampstead, Maryland (CL 9565-9568). The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. *Id.* The Governair commercial devices include three supply fans provided with airfoil isolation

dampers allowing the fans to be operated independently of each other. CL 9567. The Governair devices are arranged in a "true array" fashion. CL 9567. The Governair devices are arranged in a fan unit chamber. CL 9567. Backdraft dampers are provided in line with the respective fan units. CL 9567.

Governair Case Study for Roof Mounted Penthouse Unit, Charlotte, North Carolina (CL 9569-9572). VFDs were provided to permit variable speed control; "the customer specified the use of Graham VFD controls on both the supply and exhaust fans, a detail which Governair was easily able to accommodate with its manufacturing flexibility." CL 9570-9571. Multiple fan arrays were provided with "independent VFD controls." CL 9572. The fans used in the Governair commercial devices are plenum fans. *E.g.*, CL 9572. Backdraft dampers are provided in line with the respective fan units. CL 9571. All of the fan units shown in the Governair literature have fan units having an inlet cone, a fan and a motor and are provided with independent VFDs. CL 9570.

Governair Case Study RSA Air Handler, Arlington, Texas (CL 9573-9576). At CL 9576, four fans are shown for exhaust. The four exhaust fans are "staged" to control building pressure. CL 9576. The Governair devices include at least two vertically arranged fans in the fan array. CL 9574-9575. The Governair devices are arranged in a "true array" fashion. 9574-9575. The Governair devices are arranged in a fan unit chamber. 9574-9575. The multiple fan units of the array in the Governair commercial devices are mounted in a grid system. CL 9574. The spacing between the fans in the Governair commercial devices is less than 60% of the fan wheel diameter of the individual fans. CL 9574.

Mammoth Selection Guide for Custom Penthouse (200-410 Tons Cooling-only VAV configurations, 1992 (14 pages) (Bates Nos. CL 0304-0317). This reference discloses a Mammoth

Selection Guide for Custom Penthouse (200-410 Tons, Cooling-only VAV configurations). This reference bears a copyright date on the back page of 1992. On page 8 of the reference, a unit having six (6) fans is offered for sale. On page 11 of the reference, a unit having three (3) vertical fans is offered for sale.

Osborne, W.C. and Turner, C.G., co-editors, "Woods Practical Guide to Fan Engineering," 1964, cover pages and pp. 121, 137-138, 146-148, 208, and 218, Benham and Company, Colchester, England (Bates Nos. CL 0319-0328). This reference generally describes some rudimentary facets of fan engineering. The reference teaches that two fans operating on the same system do not provide twice the airflow that one of them would, and discusses some of the problems associated with multiple fan use. It describes solving some of those problems by providing anti-backdraft devices, *e.g.*, dampers, to prevent backflow of air through a fan unit that has been switched off. It describes varying the speed of fan units to achieve efficiency, and further describes the advantages offered by an array of smaller fan units such as lower capital expenditure, the ability to replace a single fan unit without shutting down the unit, etc. The reference further describes sound control via dampers and the use of acoustically insulating materials disposed in the duct splitters to reduce noise.

Wilcke, William F. and Morey, R. Vance, "Selecting Fans, Determining Airflow for Crop Drying, Cooling, Storage," 1998, 8 pages, Regents of the University of Minnesota (Bates Nos. CL 0329-0336). This reference teaches basic fan selection design and discloses a number of features that the patents in suit purport to claim as their own. Page 1 illustrates that a multitude of conditions can be controlled for in a system of fans designed to condition the air in a structure. Page 2 illustrates that different fan types offer different performance characteristics on a pressure-volume curve. At page 4, the use of multiple fans to replace a single, large fan is discussed. Advantages

noted there include reduction of electrical current drawn at the startup and selective turning on and off of fans to achieve desired airflow. An array of fans in a plenum is also disclosed. Performance data for multiple fans in an array is shown at Table 7.

ClimateCraft's efforts to uncover more evidence of prior art and a better understanding of that which is already of record are continuing. ClimateCraft will supplement its contentions as required under the Federal Rules of Civil Procedure, and reserves the right to supplement this response as appropriate.

Respectfully submitted,

Dated: May 7, 2008

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Attorney for ClimateCraft, Inc.

EXHIBIT A

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

HUNTAIR, INC.	)	
	)	
Plaintiff,	)	Case No. 07 C 6890
	)	
vs.	)	The Honorable Judge Coar
	)	
CLIMATECRAFT, INC.	)	Magistrate Judge Denlow
	)	
Defendant.	)	

HUNTAIR, INC.'S DISCLOSURE OF ASSERTED CLAIMS AND INFRINGEMENT CONTENTIONS

Plaintiff Huntair, Inc. ("Huntair") provides the following Disclosure of Asserted Claims and Infringement Contentions in compliance with the Scheduling Order in this case and the Notification of Docket Entry dated February 21, 2008. Huntair reserves the right to amend this disclosure to conform to the results of ongoing discovery.

ASSERTED CLAIMS

1. U.S. Patent No. 7,137,775 ("the '775 patent"): Claims 1, 2, 4, 5, 6, 7, 9, 11, 12, 14 and 15.
2. U.S. Patent No. 7,179,046 ("the '046 patent"): Claims 1, 6, 8, 9, 10, 12, 14, 15 and 19.

ACCUSED INSTRUMENTALITIES

ClimateCraft's Fan Array Products are currently accused of infringing the asserted claims of the '775 and '046 patents listed above. "ClimateCraft's Fan Array Products" mean all fan array or fan matrix products or systems manufactured, marketed or sold by ClimateCraft, including, but not limited to, the fan array system referred to by ClimateCraft as "Matrix" and the fan system that is the subject of ClimateCraft's bid to obtain a contract to install an array of fans in the Northwest Community Hospital, located in Arlington Heights, Illinois.

INFRINGEMENT

Infringement charts for the '775 patent are attached hereto as Exhibit A. Infringement charts for the '046 patent are attached hereto as Exhibit B. Unless otherwise noted in the infringement charts, all claim elements and limitations are considered to be literally infringed by ClimateCraft's Fan Array Products. Huntair reserves the right to assert infringement under the doctrine of equivalents for any limitation of the '775 or '046 patents that ClimateCraft contends is not literally present in its Fan Array Products. Huntair further reserves the right to assert

infringement under the doctrine of equivalents based on a claim construction ruling on any disputed claim terms and/or based on further information that may become available during ongoing discovery.

Respectfully submitted,

Dated: March 17, 2008

By: _____

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CERTIFICATE OF SERVICE

I hereby certify that on this 17th day of March, 2008, a true and correct copy of the foregoing document, HUNTAIR, INC.'S DISCLOSURE OF ASSERTED CLAIMS AND INFRINGEMENT CONTENTIONS, was served via U.S. Mail, first-class postage pre-paid (with a courtesy copy be e-mail) to the following counsel for ClimateCraft, Inc.:

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Attorney for Plaintiff Huntair, Inc.

EXHIBIT A

U.S. Patent No. 7,137,775 Infringement Claim Chart

U.S. Patent No. 7,137,775 B2	Infringement Contentions
1. A fan array fan section in an air-handling system comprising:	ClimateCraft's Fan Array Products have a fan array fan section in an air-handling system. *See, e.g.*, CL 1250-1341; 1437-1521.
(a) at least six fan units;	ClimateCraft's Fan Array Products have at least six fan units. *See, e.g.*, CL 1251-1252; 1438-1440.
(b) said at least six fan units arranged in a fan array;	ClimateCraft's Fan Array Products have the least six fan units arranged in a fan array. *See, e.g.*, CL 1251-1252; 1438-1440; ClimateCraft's Response to Interrogatory No. 1.
(c) an air-handling compartment within which said fan array of fan units is positioned; and	ClimateCraft's Fan Array Products have an air-handling compartment within which said fan array of fan units is positioned. *See, e.g.*, CL 1251-1252; 1438-1440.
(d) an array controller for controlling said at least six fan units to run at substantially peak efficiency by strategically turning selective ones of said at least six fan units on and off, wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency, and wherein said array controller is programmed to operate said at least six fan units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	The ClimateCraft Fan Array system at Northwest Community Hospital ("NCH") includes a Programmable Logic Controller ("PLC"), which communicates with the Building Automation System ("BAS") which may constitute an array controller for controlling said at least six fan units to run at substantially peak efficiency by strategically turning selective ones of said at least six fan units on and off, wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency, and wherein said array controller is programmed to operate said at least six fan units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range. *See, e.g.*, NCH Specification, § 2.15; CL 1250-1341; 1437-1521; ClimateCraft's Response to Interrogatory No. 1.
2. The fan array fan section in an air-handling system of claim 1, wherein said at least six fan units are plenum fans.	In ClimateCraft's Fan Array Products, the at least six fan units are plenum fans. *See, e.g.*, CL 1254; 1442.
4. The fan array fan section in an air-handling system of claim 1, wherein said at least six fan units are a plurality of fan units arranged in a fan array configuration selected from the group consisting of:	In ClimateCraft's Fan Array Products, the at least six fan units are a plurality of fan units arranged in a fan array configuration that is a true array configuration. *See, e.g.*, CL 1251-1254; 1438-1442.

U.S. Patent No. 7,137,775 B2	Infringement Contentions
(a) a true array configuration; (b) a spaced pattern array configuration; (c) a checker board array configuration; (d) rows slightly offset array configuration; (e) columns slightly offset array configuration; and (f) a staggered array configuration.	
5. The fan array fan section in an air-handling system of claim 1, wherein said at least six fan units include at least two vertically arranged fan units.	In ClimateCraft's Fan Array Products, the at least six fan units include at least two vertically arranged fan units. *See, e.g.*, CL 1251-1252; 1438-1440.
6. The fan array fan section in an air-handling system of claim 1, wherein each of said at least six fan units is positioned within a fan unit chamber.	In ClimateCraft's Fan Array Products, each of the at least six fan units is positioned within a fan unit chamber. *See, e.g.*, CL 1251-1252; 1438-1440.
7. The fan array fan section in an air-handling system of claim 1, wherein each of said at least six fan units is suspended within a respective said fan unit chamber such that there is an air relief passage there below.	In ClimateCraft's Fan Array Products, each of the at least six fan units is suspended within a respective said fan unit chamber such that there is an air relief passage there below. *See, e.g.*, CL 1251-1252; 1438-1440.
9. The fan array fan section in an air-handling system of claim 1, wherein each of said at least six fan units are mounted in a grid system.	In ClimateCraft's Fan Array Products, each of the at least six fan units are mounted in a grid system. *See, e.g.*, CL 1251-1254; 1438-1442.
11. The fan array fan section in an air-handling system of claim 1, further comprising an array of backdraft dampeners, each backdraft dampener in line with a respective fan unit.	ClimateCraft's Fan Array Products further comprise an array of backdraft dampeners, each backdraft dampener in line with a respective fan unit. *See, e.g.*, CL 1254; 1442.
12. The fan array fan section in an air-handling system of claim 1, said array controller is programmed to operate said at least six fan units at peak efficiency for a performance level based on a criteria selected from the following group of criteria: (a) air volume; (b) level of air flow; (c) pattern of air flow; and (d) number of fan units to operate.	The ClimateCraft Fan Array system at NCH includes a PLC, which communicates with the BAS which may be programmed to operate said at least six fan units at peak efficiency for a performance level based on a criteria selected from the following group of criteria: (a) air volume; (b) level of air flow; (c) pattern of air flow; and (d) number of fan units to operate. *See, e.g.*, NCH Specification, § 2.04.
14. The fan array fan section in an air-handling system of claim 1, said array controller is programmed to selectively	The ClimateCraft Fan Array system at NCH includes a PLC, which communicates with the BAS which may be programmed to selectively control the

U.S. Patent No. 7,137,775 B2	Infringement Contentions
control the speed of each of said at least six fan units to run at substantially peak efficiency.	speed of each of said at least six fan units to run at substantially peak efficiency. *See, e.g.*, NCH Specification, § 2.15; CL 1250-1341; 1437-1521; ClimateCraft's Response to Interrogatory No. 1.
15. The fan array fan section in an air-handling system of claim 1, said air-handling compartment positionable within a structure such that said air-handling system conditions the air of said structure.	In ClimateCraft's Fan Array Products, the air-handling compartment is positionable within a structure such that said air-handling system conditions the air of said structure. *See, e.g.*, CL 1250-1341; 1437-1521.

EXHIBIT B

U.S. Patent No. 7,179,046 Infringement Claim Chart

U.S. Patent No. 7,179,046 B2	Infringement Contentions
1. A fan array fan section in an air-handling system comprising:	Climate Craft's Fan Array Products have a fan array fan section in an air-handling system. *See, e.g.*, CL 1250-1341; 1437-1521.
(a) an air-handling compartment;	Climate Craft's Fan Array Products have an air-handling compartment. *See, e.g.*, CL 1251-1254; 1438-1442.
(b) a plurality of fan units;	Climate Craft's Fan Array Products have a plurality of fan units. *See, e.g.*, CL 1251-1254; 1438-1442.
(c) said plurality of fan units arranged in a fan array;	Climate Craft's Fan Array Products have said plurality of fan units arranged in a fan array. *See, e.g.*, CL 1251-1252; 1438-1440.
(d) said fan array positioned within said air-handling compartment;	Climate Craft's Fan Array Products have said fan array positioned within said air-handling compartment. *See, e.g.*, CL 1251-1252; 1438-1440.
(e) said air-handling compartment associated with a structure such that said air-handling system conditions the air of said structure; and	Climate Craft's Fan Array Products have said air-handling compartment associated with a structure such that said air-handling system conditions the air of said structure. *See, e.g.*, CL 1250-1341; 1437-1521.
(f) a control system for operating said plurality of fan units at substantially peak efficiency by strategically turning on and off selective ones of said plurality of fan units.	Climate Craft's Fan Array Products have a control system for operating said plurality of fan units at substantially peak efficiency by strategically turning on and off selective ones of said plurality of fan units. *See, e.g.*, CL 1261-1266; 1449-1452.
6. The fan array fan section in an air-handling system of claim 1, wherein said plurality of fan units are plenum fans.	In Climate Craft's Fan Array Products, the plurality of fan units are plenum fans. *See, e.g.*, CL 1254; 1442.
8. The fan array fan section in an air-handling system of claim 1, wherein said plurality of fan units are arranged in a fan array configuration selected from the group consisting of: (a) a true array configuration; (b) a spaced pattern array configuration; (c) a checker board array configuration; (d) rows slightly offset array configuration; (e) columns slightly offset array configuration; and (f) a staggered array configuration.	In Climate Craft's Fan Array Products, the plurality of fan units are arranged in a fan array configuration that is a true array configuration. *See, e.g.*, CL 1251-1254; 1438-1442.
9. The fan array fan section in an air-	In Climate Craft's Fan Array Products, the plurality

U.S. Patent No. 7,179,046 B2	Infringement Contentions
handling system of claim 1, wherein each of said plurality of fan units is positioned within a fan unit chamber.	of fan units is positioned within a fan unit chamber. *See, e.g.*, CL 1251-1252; 1438-1440.
10. The fan array fan section in an air-handling system of claim 1, wherein each of said plurality of fan units is suspended within a respective said fan unit chamber such that there is an air relief passage therebelow.	In Climate Craft's Fan Array Products, each of the plurality of fan units is suspended within a respective said fan unit chamber such that there is an air relief passage therebelow. *See, e.g.*, CL 1251-1252; 1438-1440.
12. The fan array fan section in an air-handling system of claim 1, wherein each of said plurality of fan units is mounted in a grid system.	In Climate Craft's Fan Array Products, each of the plurality of fan units is mounted in a grid system. *See, e.g.*, *See, e.g.*, CL 1251-1254; 1438-1442.
14. The fan array fan section in an air-handling system of claim 1, further comprising an array of backdraft dampeners, each backdraft dampener in line with a respective fan unit.	ClimateCraft's Fan Array Products further comprise an array of backdraft dampeners, each backdraft dampener in line with a respective fan unit. *See, e.g.*, CL 1254; 1442.
15. A fan array fan section in an air-handling system comprising:	Climate Craft's Fan Array Products have a fan array fan section in an air-handling system. *See, e.g.*, CL 1250-1341; 1437-1521.
(a) an air-handling compartment;	Climate Craft's Fan Array Products have an air-handling compartment. *See, e.g.*, CL 1251-1254; CL 1438-1442.
(b) a plurality of fan units;	Climate Craft's Fan Array Products have a plurality of fan units. *See, e.g.*, CL 1251-1254; 1438-1442.
(c) said plurality of fan units arranged in a fan array;	Climate Craft's Fan Array Products have said plurality of fan units arranged in a fan array. *See, e.g.*, CL 1251-1252; 1438-1440.
(d) said fan array positioned within said air-handling compartment;	Climate Craft's Fan Array Products have said fan array positioned within said air-handling compartment. *See, e.g.*, CL 1251-1252; 1438-1440.
(e) said air-handling compartment association with a structure such that the said air-handling system conditions the air of said structure; and	Climate Craft's Fan Array Products have said air-handling compartment associated with a structure such that the said air-handling system conditions the air of said structure. *See, e.g.*, CL 1250-1341; 1437-1521.
(f) a control system for controlling said plurality of fan units, said control system allowing control of the speed of the fan units in said plurality of fan units such that they run at substantially peak efficiency.	Climate Craft's Fan Array Products have a control system for controlling said plurality of fan units, said control system allowing control of the speed of the fan units in said plurality of fan units such that they run at substantially peak efficiency. *See, e.g.*, CL 1261-1266; 1449-1452.
19. A fan array fan section in an air-handling system comprising:	Climate Craft's Fan Array Products have a fan array fan section in an air-handling system. *See, e.g.*, CL

U.S. Patent No. 7,179,046 B2	Infringement Contentions
	1250-1341; 1437-1521.
(a) an air-handling compartment;	Climate Craft's Fan Array Products have an air-handling compartment. *See, e.g.*, CL 1251-1254; 1438-1440.
(b) a plurality of independently controllable fan units;	Climate Craft's Fan Array Products have a plurality of independently controllable fan units. *See, e.g.*, CL 1251-1254; 1261-1266; 1438-1442; 1449-1452.
(c) said plurality of fan units arranged in a fan array;	Climate Craft's Fan Array Products have said plurality of fan units arranged in a fan array. *See, e.g.*, CL 1251-1252; 1438-1440.
(d) said fan array positioned within said air-handling compartment;	Climate Craft's Fan Array Products have said fan array positioned within said air-handling compartment. *See, e.g.*, CL 1251-1252; 1438-1440.
(e) said air-handling compartment associated with a structure such that the said air-handling system conditions the air of said structure;	Climate Craft's Fan Array Products have said air-handling compartment associated with a structure such that the said air-handling system conditions the air of said structure. *See, e.g.*, CL 1250-1341; 1438-1442.
(f) a control system for controlling the speed of the fan units in said plurality of fan units such that they run at substantially peak efficiency.	Climate Craft's Fan Array Products have a control system for controlling the speed of the fan units in said plurality of fan units such that they run at substantially peak efficiency. *See, e.g.*, CL 1261-1266; 1449-1452.

EXHIBIT B

Claim Chart Comparison The AAON commercial devices to All Claims of Both Patents In Suit

Patents in Suit U.S. Patent No. 7,137,775 and U.S. Patent No. 7,179,046	**The AAON commercial devices**
Claim Elements '775 Patent	
1. A fan array fan section in an air-handling system comprising:	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(a) at least six fan units;	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(b) said at least six fan units arranged in a fan array;	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(c) an air-handling compartment within which said fan array of fan units is positioned; and	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(d) an array controller for controlling said at least six fan units to run at substantially peak efficiency by strategically turning selective ones of said at least six fan units on and off,	In the AAON commercial devices, independent control of the individual fans is facilitated by the options available to the consumer listed at CL 303. These show that fans can be operated independently with separate variable frequency drives (VFDs). See also CL 295-297, 300. As shown in the AAON commercial devices, with separate VFDs per fan, the fans could be separately turned on and off. CL 303; see also CL 295-297, 300.
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Generally, all fans individually have a peak operating range, outside of which they operate at a reduced efficiency.
and wherein said array controller is programmed to operate said at least six fan	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common

units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	knowledge. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
2. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said at least six fan units are plenum fans.	The fans used in the AAON commercial devices are plenum fans. CL 295-297.
3. The fan array fan section in an air-handling system of 1,	*See* response to claim 1, set forth above.
wherein said air-handling compartment has an airway path, said airway path being less than 72 inches.	The AAON commercial devices include an airway path of less than 72 inches. CL 295-297.
4. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said at least six fan units are a plurality of fan units arranged in a fan array configuration selected from the group consisting of:	The AAON commercial devices are arranged in a "true array" configuration. CL 295-297.
(a) a true array configuration;	The AAON commercial devices are arranged in a "true array" configuration. CL 295-297.
(b) a spaced pattern array	

configuration;	
(c) a checker board array configuration;	
(d) rows slightly offset array configuration;	
(e) columns slightly offset array configuration; and	
(f) a staggered array configuration.	
5. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said at least six fan units include at least two vertically arranged fan units.	The two-by-two arrangement of fans used in the AAON commercial devices includes at least two vertically arranged fan units. CL 295-297.
6. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units is positioned within a fan unit chamber.	Each of the fans used in the AAON commercial devices is positioned within a fan unit chamber. CL 295-297
7. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units is suspended within a respective said fan unit chamber such that there is an air relief passage there	An air relief passage or fan bypass damper was commonly known as a device to reduce fan flow by bypassing air from the high to low side of the fan.

below.	
8. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units is positioned within a fan unit chamber having at least one acoustically absorptive insulation surface.	The AAON commercial devices were available with "perf. liners." These perforated liners were positioned within each fan unit chamber to provide an acoustically absorptive insulation surface. CL 297-299.
9. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units are mounted in a grid system.	As shown, the four fans in the AAON commercial devices are mounted in a grid system. CL 297-299.
10. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units has a fan wheel diameter, wherein spacing between said at least six fan units is less than 60% of said fan wheel diameter.	The spacing between the fans in the AAON commercial devices is less than 60% of the fan wheel diameter of the individual fans. CL 295-297.
11. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
further comprising an array of	The fan units of the AAON commercial devices are provided with backdraft dampers. CL 300.

backdraft dampeners, each backdraft dampener in line with a respective fan unit.	
12. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
said array controller is programmed to operate said at least six fan units at peak efficiency for a performance level based on a criteria selected from the following group of criteria:	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common knowledge. While controlling the fan units to account for one of the claimed criteria is not specifically shown, no written description, enabling disclosure or best mode of doing this is shown in the patents in suit. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
(a) air volume;	
(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to operate.	
13. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
said array controller is programmed to operate said at least six fan units to produce a stable operating point and eliminate the surge effects.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. While controlling the fan units to operate outside of the range producing unstable operation is not specifically shown by the written materials describing the AAON commercial devices, controlling the operation of fans to prevent unstable operation has been known for many years. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
14. The fan array fan section in an air-handling	*See* response to claim 1, set forth above.

system of claim 1,	
said array controller is programmed to selectively control the speed of each of said at least six fan units to run at substantially peak efficiency.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common knowledge. While controlling the individual fan units to run at their respective "peak efficiency" is shown, and the provision of independent VFDs per fan permits running the fans at different speeds with respect to one another, no written description, enabling disclosure or best mode of running the fans in any way is shown in the patents in suit. Additionally, as phrased, the term "substantially peak efficiency is indefinite. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
15. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
said air-handling compartment positionable within a structure such that said air-handling system conditions the air of said structure.	The AAON commercial devices were positionable so that the air handling system conditioned the air of a structure. CL 301-302.
16. A fan array fan section in an air-handling system comprising:	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(a) a plurality of independently controllable fan units, each fan unit comprising an inlet cone, a fan, and a motor;	The AAON commercial devices contain a plurality of independently controllable fan units and each fan unit has an inlet cone, a fan, and a motor. CL 295-297.
(b) said plurality of fan units arranged in a fan array;	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(c) an air-handling compartment within which	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.

said fan array of fan units is positioned;	
(d) an array controller for controlling said plurality of fan units to run at substantially peak efficiency by strategically turning selective ones of said plurality of fan units on and off; wherein	In the AAON commercial devices, independent control of the individual fans is facilitated by the options available to the consumer listed at CL 303. These show that fans can be operated independently with separate variable frequency drives (VFDs). See also CL 295-297, 300.
(e) each of said plurality of fan units has a fan wheel diameter, wherein spacing between said pluality of fan units is less than 60% of said fan wheel diameter.	The spacing between the fans in the AAON commercial devices is less than 60% of the fan wheel diameter of the individual fans. CL 295-297.
17. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said plurality of fan units are plenum fans.	The fans used in the AAON commercial devices are plenum fans. CL 295-297.
18. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said air-handling compartment has an airway path, said airway path being less than 72 inches.	The AAON commercial devices include an airway path of less than 72 inches. CL 295-297.
19. The fan array fan section in an air-handling	*See* response to claim 16, set forth above.

system of claim 16,	
wherein said plurality of fan units are a plurality of fan units arranged in a fan array configuration selected from the group consisting of:	The AAON commercial devices are arranged in a "true array" configuration. CL 295-297.
(a) a true array configuration;	The AAON commercial devices are arranged in a "true array" configuration. CL 295-297.
(b) a spaced pattern array configuration;.	
(c) a checker board array configuration;	
(d) rows slightly offset array configuration;	
(e) columns slightly offset array configuration; and	
(f) a staggered array configuration.	
20. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said plurality of fan units include at least two vertically arranged fan units.	The two-by-two arrangement of fans used in the AAON commercial devices includes at least two vertically arranged fan units. CL 295-297.
21. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each of said plurality of fan units is positioned within a fan unit chamber.	Each of the fans used in the AAON commercial devices is positioned within a fan unit chamber. CL 295-297

22. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each of said plurality of fan units is suspended within a respective said fan unit chamber such that there is an air relief passage therebelow.	An air relief passage or fan bypass damper was commonly known as a device to reduce fan flow by bypassing air from the high to low side of the fan.
23. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each of said plurality of fan units is positioned within a fan unit chamber having at least one acoustically absorptive insulation surface.	The AAON commercial devices were available with "perf. liners." These perforated liners were positioned within each fan unit chamber to provide an acoustically absorptive insulation surface. CL 297-299.
24. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each of said plurality of fan units is mounted in a grid system.	As shown, the four fans in the AAON commercial devices are mounted in a grid system. CL 297-299.
25. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
further comprising an array of backdraft dampeners,	The fan units of the AAON commercial devices are provided with backdraft dampers. CL 300.
each backdraft dampener in	

line with a respective fan unit.	
26. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Generally, all fans individually have a peak operating range, outside of which they operate at a reduced efficiency.
wherein said array controller is programmed to operate said plurality of fan units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common knowledge. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
27. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said array controller is programmed to operate said plurality of fan units at peak efficiency for a performance level based on a criteria selected from the following group of criteria:	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common knowledge. While controlling the fan units to account for one of the claimed criteria is not specifically shown, no written description, enabling disclosure or best mode of doing this is shown in the patents in suit. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
(a) air volume	
(b) level of air flow;	

(c) pattern of air flow; and	
(d) number of fan units to operate.	
28. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said array controller is programmed to operate said plurality of fan units to produce a stable operating point and eliminate the surge effects.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. While controlling the fan units to operate outside of the range producing unstable operation is not specifically shown by the written materials describing the AAON commercial devices, controlling the operation of fans to prevent unstable operation has been known for many years. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
29. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said array controller is programmed to selectively control the speed of each of said plurality of fan units to run at substantially peak efficiency.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common knowledge. While controlling the individual fan units to run at their respective "peak efficiency" is shown, and the provision of independent VFDs per fan permits running the fans at different speeds with respect to one another, no written description, enabling disclosure or best mode of running the fans in any way is shown in the patents in suit. Additionally, as phrased, the term "substantially peak efficiency is indefinite. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
30. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said air-handling compartment positionable	The AAON commercial devices were positionable so that the air handling system conditioned the air of a structure. CL 301-302.

within a structure such that said air-handling system conditions the air of said structure.	
Claim Elements '046 Patent	
1. A fan array fan section in an air-handling system comprising:	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(a) an air-handling compartment;	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(b) a plurality of fan units;	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(c) said plurality of fan units arranged in a fan array;	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(d) said fan array positioned within said air-handling compartment;	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(e) said air-handling compartment associated with a structure such that said air-handling system conditions the air of said structure; and	The AAON commercial devices were positionable so that the air handling system conditioned the air of a structure. CL 301-302.
(f) a control system for operating said plurality of fan units at substantially peak efficiency by strategically turning on and off selective ones of said plurality of fan units.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common knowledge. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
2. The fan array fan	*See* response to claim 1, set forth above.

section in an air-handling system of claim 1,	
wherein said control system comprises a programmable array controller.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common knowledge. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
3. The fan array fan section in an air-handling system of claim 2,	*See* response to claim 2, set forth above.
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Generally, all fans individually have a peak operating range, outside of which they operate at a reduced efficiency.
wherein said array controller is programmed to operate said plurality of fan units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common knowledge. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
4. The fan array fan section in an air-handling system of claim 2,	*See* response to claim 2, set forth above.
where said array controller is programmed to operate said plurality of fan units at peak	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common

efficiency for a performance level based on a criterion selected from the following group of criteria:	knowledge. While controlling the fan units to account for one of the claimed criteria is not specifically shown, no written description, enabling disclosure or best mode of doing this is shown in the patents in suit. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
(a) air volume;	
(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to operate.	
5. The fan array fan section in an air-handling system of claim 2,	*See* response to claim 2, set forth above.
wherein said array controller is programmed to operate said plurality of fan units to produce a stable operating point and eliminate the surge effects.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. While controlling the fan units to operate outside of the range producing unstable operation is not specifically shown by the written materials describing the AAON commercial devices, controlling the operation of fans to prevent unstable operation has been known for many years. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
6. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said plurality of fan units are plenum fans.	The fans used in the AAON commercial devices are plenum fans. CL 295-297.
7. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said air-handling compartment has an airway	The AAON commercial devices include an airway path of less than 72 inches. CL 295-297.

path, said airway path being less than 72 inches.	
8. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said plurality of fan units are arranged in a fan array configuration selected from the group consisting of:	The AAON commercial devices are arranged in a "true array" configuration. CL 295-297.
(a) a true array configuration;	The AAON commercial devices are arranged in a "true array" configuration. CL 295-297.
(b) a spaced pattern array configuration;	
(c) a checker board array configuration;	
(d) rows slightly offset array configuration;	
(e) columns slightly offset array configuration; and	
(f) a staggered array configuration.	
9. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units is positioned within a fan unit chamber.	Each of the fans used in the AAON commercial devices is positioned within a fan unit chamber. CL 295-297
10. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.

wherein each of said plurality of fan units is suspended within a respective said fan unit chamber such that there is an air relief passage therebelow.	An air relief passage or fan bypass damper was commonly known as a device to reduce fan flow by bypassing air from the high to low side of the fan.
11. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units is positioned within a fan unit chamber having at least one acoustically absorptive insulation surface.	The AAON commercial devices were available with "perf. liners." These perforated liners were positioned within each fan unit chamber to provide an acoustically absorptive insulation surface. CL 297-299.
12. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units is mounted in a grid system.	As shown, the four fans in the AAON commercial devices are mounted in a grid system. CL 297-299.
13. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units has a fan wheel diameter, wherein spacing between said plurality of fan units is less than 60% of said fan wheel diameter.	The spacing between the fans in the AAON commercial devices is less than 60% of the fan wheel diameter of the individual fans. CL 295-297.

14. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
further comprising an array of backdraft dampeners,	The fan units of the AAON commercial devices are provided with backdraft dampers. CL 300.
each backdraft dampener in line with a respective fan unit.	
15. A fan array fan section in an air-handling system comprising:	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(a) an air-handling compartment;	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(b) a plurality of fan units;	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(c) said plurality of fan units arranged in a fan array;	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(d) said fan array positioned within said air-handling compartment;	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(e) said air-handling compartment association with a structure such that the said air-handling system conditions the air of said structure; and	The AAON commercial devices were positionable so that the air handling system conditioned the air of a structure. CL 301-302.
(f) a control system for controlling said plurality of fan units,	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common knowledge. While controlling the individual fan units to run at their respective "peak efficiency" is shown, and the provision of independent VFDs per fan permits running the fans at different speeds with respect to one another, no written description, enabling disclosure or best mode of running the

	fans in any way is shown in the patents in suit. Additionally, as phrased, the term "substantially peak efficiency is indefinite. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
said control system allowing control of the speed of the fan units in said plurality of fan units such that they run at substantially peak efficiency.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common knowledge. While controlling the individual fan units to run at their respective "peak efficiency" is shown, and the provision of independent VFDs per fan permits running the fans at different speeds with respect to one another, no written description, enabling disclosure or best mode of running the fans in any way is shown in the patents in suit. Additionally, as phrased, the term "substantially peak efficiency is indefinite. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
16. The fan array section in an air-bundling system of claim 15	*See* response to claim 15, set forth above.
wherein said control system comprises a programmable array controller.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common knowledge. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
17. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Generally, all fans individually have a peak operating range, outside of which they operate at a reduced efficiency.
wherein said array controller is programmed to operate said plurality of fan units at	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common

substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	knowledge. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
18. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said array controller is programmed to operate said plurality of fan units at peak efficiency for a performance level based on a criterion selected from the following group of criteria:	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common knowledge. While controlling the fan units to account for one of the claimed criteria is not specifically shown, no written description, enabling disclosure or best mode of doing this is shown in the patents in suit. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.
(a) air volume;	
(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to operate.	
19. A fan array fan section in an air-handling system comprising:	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(a) an air-handling compartment;	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(b) a plurality of independently controllable fan units;	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(c) said plurality of fan units	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-

arranged in a fan array;	by-two configuration. CL 295-297.
(d) said fan array positioned within said air-handling compartment;	The AAON commercial devices show at least four fans arranged in an air-handling system, in a two-by-two configuration. CL 295-297.
(e) said air-handling compartment associated with a structure such that the said air-handling system conditions the air of said structure; and	The AAON commercial devices were positionable so that the air handling system conditioned the air of a structure. CL 301-302.
(f) a control system for controlling the speed of the fan units in said plurality of fan units such that they run at substantially peak efficiency.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common knowledge. While controlling the individual fan units to run at their respective "peak efficiency" is shown, and the provision of independent VFDs per fan permits running the fans at different speeds with respect to one another, no written description, enabling disclosure or best mode of running the fans in any way is shown in the patents in suit. Additionally, as phrased, the term "substantially peak efficiency is indefinite. Investigation continues into the control of the AAON commercial devices. CL 295-297, 300.

EXHIBIT C

Claim Chart Comparison The Governair commercial devices to All Claims of Both Patents In Suit

Patents in Suit U.S. Patent No. 7,137,775 and U.S. Patent No. 7,179,046	**The Governair commercial devices**
Claim Elements '775 Patent	
1. A fan array fan section in an air-handling system comprising:	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. At CL 9576, four fans are shown for exhaust.
(a) at least six fan units;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. At CL 9576, four fans are shown for exhaust.
(b) said at least six fan units arranged in a fan array;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. At CL 9576, four fans are shown for exhaust.
(c) an air-handling compartment within which said fan array of fan units is positioned; and	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. At CL 9576, four fans are shown for exhaust.
(d) an array controller for controlling said at least six fan units to run at substantially peak efficiency by strategically turning selective ones of said at least six fan units on and off,	The Governair commercial devices include three supply fans provided with airfoil isolation dampers allowing the fans to be operated independently of each other. CL 9567. VFDs were provided to permit variable speed control; "the customer specified the use of Graham VFD controls on both the supply and exhaust fans, a detail which Governair was easily able to accommodate with its manufacturing flexibility." CL 9570-9571. Multiple fan arrays were provided with "independent VFD controls." CL 9572. The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. Operating fans at or near their known peak efficiency was common knowledge. The four exhaust fans are "staged" to control building pressure. CL 9576. Investigation continues into the control of the Governair commercial devices. CL 9565-9576.
wherein each fan unit has a peak efficiency operating range outside of which it	Generally, all fans individually have a peak operating range, outside of which they operate at a reduced efficiency.

operates at a reduced efficiency,	
and wherein said array controller is programmed to operate said at least six fan units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. The four exhaust fans are "staged" to control building pressure. CL 9576. Operating fans at or near their known peak efficiency was common knowledge. Investigation continues into the control of the Governair commercial devices. CL 9565-9576.
2. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said at least six fan units are plenum fans.	The fans used in the Governair commercial devices are plenum fans. E.g., CL 9572.
3. The fan array fan section in an air-handling system of 1,	*See* response to claim 1, set forth above.
wherein said air-handling compartment has an airway path, said airway path being less than 72 inches.	
4. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said at least six fan units are a plurality of fan	The Governair devices are arranged in a "true array" fashion. CL 9567, 9574-9575.

units arranged in a fan array configuration selected from the group consisting of:	
(a) a true array configuration;	The Governair devices are arranged in a "true array" fashion. CL 9567, 9574-9575.
(b) a spaced pattern array configuration;	
(c) a checker board array configuration;	
(d) rows slightly offset array configuration;	
(e) columns slightly offset array configuration; and	
(f) a staggered array configuration.	
5. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said at least six fan units include at least two vertically arranged fan units.	The Governair devices include at least two vertically arranged fans in the fan array. CL 9574-9575.
6. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units is positioned within a fan unit chamber.	The Governair devices are arranged in a fan unit chamber. CL 9567, 9574-9575.
7. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.

wherein each of said at least six fan units is suspended within a respective said fan unit chamber such that there is an air relief passage there below.	An air relief passage or fan bypass damper was commonly known as a device to reduce fan flow by bypassing air from the high to low side of the fan.
8. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units is positioned within a fan unit chamber having at least one acoustically absorptive insulation surface.	
9. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units are mounted in a grid system.	The multiple fan units of the array in the Governair commercial devices are mounted in a grid system. CL 9574.
10. The fan array fan section in an air-handling system of claim 1,	
wherein each of said at least six fan units has a fan wheel diameter, wherein spacing between said at least six fan units is less than 60% of said fan wheel diameter.	The spacing between the fans in the Governair commercial devices is less than 60% of the fan wheel diameter of the individual fans. CL 9574.

11. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
further comprising an array of backdraft dampeners, each backdraft dampener in line with a respective fan unit.	Backdraft dampers are provided in line with the respective fan units. CL 9567, 9571.
12. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
said array controller is programmed to operate said at least six fan units at peak efficiency for a performance level based on a criteria selected from the following group of criteria:	While the specific control methodology of the structure is not described by the written references, the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency, and the four exhaust fans are "staged" to control building pressure. CL 9576. Investigation continues into the control of the Governair commercial devices. CL 9565-9576.
(a) air volume;	
(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to operate.	
13. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
said array controller is programmed to operate said at least six fan units to produce a stable operating point and eliminate the surge effects.	While the specific control methodology of the structure is not described by the written references, the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency, and the four exhaust fans are "staged." CL 9576. While controlling the fan units to operate outside of the range producing surge is not specifically shown, no written description, enabling disclosure or best mode of doing this is shown in the patents in suit.

	Investigation continues into the control of the Governair commercial devices. CL 9565-9576.
14. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
said array controller is programmed to selectively control the speed of each of said at least six fan units to run at substantially peak efficiency.	The Governair commercial devices include three supply fans provided with airfoil isolation dampers allowing the fans to be operated independently of each other. CL 9567. VFDs were provided to permit variable speed control; "the customer specified the use of Graham VFD controls on both the supply and exhaust fans, a detail which Governair was easily able to accommodate with its manufacturing flexibility." CL 9570-9571. Multiple fan arrays were provided with "independent VFD controls." CL 9572. The four exhaust fans are "staged" to control building pressure. CL 9576. While the specific control methodology of the structure is not described by the written references, While controlling the fan units to operate at "substantially peak efficiency" is not specifically shown, no written description, enabling disclosure or best mode of doing this is shown in the patents in suit. Investigation continues into the control of the Governair commercial devices.
15. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
said air-handling compartment positionable within a structure such that said air-handling system conditions the air of said structure.	The Governair commercial devices are positioned to provide conditioning of the air in the air handling system.
16. A fan array fan section in an air-handling system comprising:	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. At CL 9576, four fans are shown for exhaust.
(a) a plurality of independently controllable fan units, each fan unit comprising an inlet cone, a	All of the fan units shown in the Governair literature have fan units having an inlet cone, a fan and a motor and are provided with independent VFDs. CL 9570.

fan, and a motor;	
(b) said plurality of fan units arranged in a fan array;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. At CL 9576, four fans are shown for exhaust.
(c) an air-handling compartment within which said fan array of fan units is positioned;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. At CL 9576, four fans are shown for exhaust.
(d) an array controller for controlling said plurality of fan units to run at substantially peak efficiency by strategically turning selective ones of said plurality of fan units on and off; wherein	The Governair commercial devices include three supply fans provided with airfoil isolation dampers allowing the fans to be operated independently of each other. CL 9567. VFDs were provided to permit variable speed control; "the customer specified the use of Graham VFD controls on both the supply and exhaust fans, a detail which Governair was easily able to accommodate with its manufacturing flexibility." CL 9570-9571. Multiple fan arrays were provided with "independent VFD controls." CL 9572. The four exhaust fans are "staged" to control building pressure. CL 9576.
(e) each of said plurality of fan units has a fan wheel diameter, wherein spacing between said pluality of fan units is less than 60% of said fan wheel diameter.	The spacing between the fans in the Governair commercial devices is less than 60% of the fan wheel diameter of the individual fans. CL 9574.
17. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said plurality of fan units are plenum fans.	The fans used in the Governair commercial devices are plenum fans. E.g., CL 9572.
18. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said air-handling	

compartment has an airway path, said airway path being less than 72 inches.	
19. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said plurality of fan units are a plurality of fan units arranged in a fan array configuration selected from the group consisting of:	
(a) a true array configuration;	
(b) a spaced pattern array configuration;.	
(c) a checker board array configuration;	
(d) rows slightly offset array configuration;	
(e) columns slightly offset array configuration; and	
(f) a staggered array configuration.	
20. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said plurality of fan units include at least two vertically arranged fan units.	The Governair devices include at least two vertically arranged fans in the fan array. CL 9574-9575.
21. The fan array fan	*See* response to claim 16, set forth above.

section in an air-handling system of claim 16,	
wherein each of said plurality of fan units is positioned within a fan unit chamber.	The Governair devices are arranged in a fan unit chamber. CL 9567, 9574-9575.
22. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each of said plurality of fan units is suspended within a respective said fan unit chamber such that there is an air relief passage therebelow.	An air relief passage or fan bypass damper was commonly known as a device to reduce fan flow by bypassing air from the high to low side of the fan.
23. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each of said plurality of fan units is positioned within a fan unit chamber having at least one acoustically absorptive insulation surface.	
24. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each of said plurality of fan units is mounted in a grid system.	The multiple fan units of the array in the Governair commercial devices are mounted in a grid system. CL 9574.

25. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
further comprising an array of backdraft dampeners,	Backdraft dampers are provided in line with the respective fan units. CL 9567, 9571.
each backdraft dampener in line with a respective fan unit.	
26. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Generally, all fans individually have a peak operating range, outside of which they operate at a reduced efficiency.
wherein said array controller is programmed to operate said plurality of fan units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. The four exhaust fans are "staged" to control building pressure. CL 9576. Operating fans at or near their known peak efficiency was common knowledge. Investigation continues into the control of the Governair commercial devices. CL 9565-9576.
27. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said array controller is programmed to operate said plurality of fan units at peak	While the specific control methodology of the structure is not described by the written references, the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency, and the four exhaust fans are "staged" to control building

efficiency for a performance level based on a criteria selected from the following group of criteria:	pressure. CL 9576. Investigation continues into the control of the Governair commercial devices. CL 9565-9576.
(a) air volume	
(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to operate.	
28. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said array controller is programmed to operate said plurality of fan units to produce a stable operating point and eliminate the surge effects.	While the specific control methodology of the structure is not described by the written references, the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency, and the four exhaust fans are "staged." CL 9576. While controlling the fan units to operate outside of the range producing surge is not specifically shown, no written description, enabling disclosure or best mode of doing this is shown in the patents in suit. Investigation continues into the control of the Governair commercial devices. CL 9565-9576.
29. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said array controller is programmed to selectively control the speed of each of said plurality of fan units to run at substantially peak efficiency.	The Governair commercial devices include three supply fans provided with airfoil isolation dampers allowing the fans to be operated independently of each other. CL 9567. VFDs were provided to permit variable speed control; "the customer specified the use of Graham VFD controls on both the supply and exhaust fans, a detail which Governair was easily able to accommodate with its manufacturing flexibility." CL 9570-9571. Multiple fan arrays were provided with "independent VFD controls." CL 9572. The four exhaust fans are "staged" to control building pressure. CL 9576. While the specific control methodology of the structure is not described by the written references, While controlling the fan units to operate at "substantially peak efficiency" is not specifically shown, no written description, enabling disclosure or best mode of doing this is shown in the patents in suit. Investigation continues into the control of the Governair commercial devices.

30. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said air-handling compartment positionable within a structure such that said air-handling system conditions the air of said structure.	The Governair commercial devices are positioned to provide conditioning of the air in the air handling system.
Claim Elements '046 Patent	
1. A fan array fan section in an air-handling system comprising:	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. At CL 9576, four fans are shown for exhaust.
(a) an air-handling compartment;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. At CL 9576, four fans are shown for exhaust.
(b) a plurality of fan units;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. At CL 9576, four fans are shown for exhaust.
(c) said plurality of fan units arranged in a fan array;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. At CL 9576, four fans are shown for exhaust.
(d) said fan array positioned within said air-handling compartment;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. At CL 9576, four fans are shown for exhaust.
(e) said air-handling compartment associated with a structure such that said air-handling system conditions the air of said structure; and	The Governair commercial devices are positioned to provide conditioning of the air in the air handling system.
(f) a control system for	The specific control methodology of the structure is not described by the written references, but the

operating said plurality of fan units at substantially peak efficiency by strategically turning on and off selective ones of said plurality of fan units.	provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. The four exhaust fans are "staged" to control building pressure. CL 9576. Operating fans at or near their known peak efficiency was common knowledge. Investigation continues into the control of the Governair commercial devices. CL 9565-9576.
2. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said control system comprises a programmable array controller.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. The four exhaust fans are "staged" to control building pressure. CL 9576. Operating fans at or near their known peak efficiency was common knowledge. Investigation continues into the control of the Governair commercial devices. CL 9565-9576.
3. The fan array fan section in an air-handling system of claim 2,	*See* response to claim 2, set forth above.
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Generally, all fans individually have a peak operating range, outside of which they operate at a reduced efficiency.
wherein said array controller is programmed to operate said plurality of fan units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. The four exhaust fans are "staged" to control building pressure. CL 9576. Operating fans at or near their known peak efficiency was common knowledge. Investigation continues into the control of the Governair commercial devices. CL 9565-9576.

efficiency operating range.	
4. The fan array fan section in an air-handling system of claim 2,	*See* response to claim 2, set forth above.
where said array controller is programmed to operate said plurality of fan units at peak efficiency for a performance level based on a criterion selected from the following group of criteria:	While the specific control methodology of the structure is not described by the written references, the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency, and the four exhaust fans are "staged" to control building pressure. CL 9576. Investigation continues into the control of the Governair commercial devices. CL 9565-9576.
(a) air volume;	
(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to operate.	
5. The fan array fan section in an air-handling system of claim 2,	*See* response to claim 2, set forth above.
wherein said array controller is programmed to operate said plurality of fan units to produce a stable operating point and eliminate the surge effects.	While the specific control methodology of the structure is not described by the written references, the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency, and the four exhaust fans are "staged." CL 9576. While controlling the fan units to operate outside of the range producing surge is not specifically shown, no written description, enabling disclosure or best mode of doing this is shown in the patents in suit. Investigation continues into the control of the Governair commercial devices. CL 9565-9576.
6. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said plurality of fan	The fans used in the Governair commercial devices are plenum fans. E.g., CL 9572.

units are plenum fans.	
7. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said air-handling compartment has an airway path, said airway path being less than 72 inches.	
8. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said plurality of fan units are arranged in a fan array configuration selected from the group consisting of:	The Governair devices are arranged in a "true array" fashion. CL 9567, 9574-9575.
(a) a true array configuration;	The Governair devices are arranged in a "true array" fashion. CL 9567, 9574-9575.
(b) a spaced pattern array configuration;	
(c) a checker board array configuration;	
(d) rows slightly offset array configuration;	
(e) columns slightly offset array configuration; and	
(f) a staggered array configuration.	
9. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.

wherein each of said plurality of fan units is positioned within a fan unit chamber.	The Governair devices are arranged in a fan unit chamber. CL 9567, 9574-9575.
10. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units is suspended within a respective said fan unit chamber such that there is an air relief passage therebelow.	An air relief passage or fan bypass damper was commonly known as a device to reduce fan flow by bypassing air from the high to low side of the fan.
11. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units is positioned within a fan unit chamber having at least one acoustically absorptive insulation surface.	
12. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units is mounted in a grid system.	The multiple fan units of the array in the Governair commercial devices are mounted in a grid system. CL 9574.
13. The fan array fan section in an air-handling	*See* response to claim 1, set forth above.

system of claim 1,	
wherein each of said plurality of fan units has a fan wheel diameter, wherein spacing between said plurality of fan units is less than 60% of said fan wheel diameter.	The spacing between the fans in the Governair commercial devices is less than 60% of the fan wheel diameter of the individual fans. CL 9574.
14. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
further comprising an array of backdraft dampeners,	Backdraft dampers are provided in line with the respective fan units. CL 9567, 9571.
each backdraft dampener in line with a respective fan unit.	
15. A fan array fan section in an air-handling system comprising:	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. At CL 9576, four fans are shown for exhaust.
(a) an air-handling compartment;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. At CL 9576, four fans are shown for exhaust.
(b) a plurality of fan units;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. At CL 9576, four fans are shown for exhaust.
(c) said plurality of fan units arranged in a fan array;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. At CL 9576, four fans are shown for exhaust.
(d) said fan array positioned within said air-handling compartment;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. At CL 9576, four fans are shown for exhaust.
(e) said air-handling compartment association with a structure such that the said	The Governair commercial devices are positioned to provide conditioning of the air in the air handling system.

air-handling system conditions the air of said structure; and	
(f) a control system for controlling said plurality of fan units,	The Governair commercial devices include three supply fans provided with airfoil isolation dampers allowing the fans to be operated independently of each other. CL 9567. VFDs were provided to permit variable speed control; "the customer specified the use of Graham VFD controls on both the supply and exhaust fans, a detail which Governair was easily able to accommodate with its manufacturing flexibility." CL 9570-9571. Multiple fan arrays were provided with "independent VFD controls." CL 9572. The four exhaust fans are "staged" to control building pressure. CL 9576. While the specific control methodology of the structure is not described by the written references, While controlling the fan units to operate at "substantially peak efficiency" is not specifically shown, no written description, enabling disclosure or best mode of doing this is shown in the patents in suit. Investigation continues into the control of the Governair commercial devices.
said control system allowing control of the speed of the fan units in said plurality of fan units such that they run at substantially peak efficiency.	The Governair commercial devices include three supply fans provided with airfoil isolation dampers allowing the fans to be operated independently of each other. CL 9567. VFDs were provided to permit variable speed control; "the customer specified the use of Graham VFD controls on both the supply and exhaust fans, a detail which Governair was easily able to accommodate with its manufacturing flexibility." CL 9570-9571. Multiple fan arrays were provided with "independent VFD controls." CL 9572. The four exhaust fans are "staged" to control building pressure. CL 9576. While the specific control methodology of the structure is not described by the written references, While controlling the fan units to operate at "substantially peak efficiency" is not specifically shown, no written description, enabling disclosure or best mode of doing this is shown in the patents in suit. Investigation continues into the control of the Governair commercial devices.
16. The fan array section in an air-bundling system of claim 15	*See* response to claim 15, set forth above.
wherein said control system comprises a programmable array controller.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. The four exhaust fans are "staged" to control building pressure. CL 9576. Operating fans at or near their known peak efficiency was common knowledge. Investigation continues into the control of the Governair commercial devices. CL 9565-9576.

17. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Generally, all fans individually have a peak operating range, outside of which they operate at a reduced efficiency.
wherein said array controller is programmed to operate said plurality of fan units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	The specific control methodology of the structure is not described by the written references, but the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency. The four exhaust fans are "staged" to control building pressure. CL 9576. Operating fans at or near their known peak efficiency was common knowledge. Investigation continues into the control of the Governair commercial devices. CL 9565-9576.
18. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said array controller is programmed to operate said plurality of fan units at peak efficiency for a performance level based on a criterion selected from the following group of criteria:	While the specific control methodology of the structure is not described by the written references, the provision of separate VFD and backdraft dampers with each fan facilitates turning off fans to permit others to run at peak efficiency, and the four exhaust fans are "staged" to control building pressure. CL 9576. Investigation continues into the control of the Governair commercial devices. CL 9565-9576.
(a) air volume;	
(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to	

operate.	
19. A fan array fan section in an air-handling system comprising:	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. At CL 9576, four fans are shown for exhaust.
(a) an air-handling compartment;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. At CL 9576, four fans are shown for exhaust.
(b) a plurality of independently controllable fan units;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. At CL 9576, four fans are shown for exhaust.
(c) said plurality of fan units arranged in a fan array;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. At CL 9576, four fans are shown for exhaust.
(d) said fan array positioned within said air-handling compartment;	The Governair commercial devices include at least three airfoil centrifugal plenum supply fans in an air-handling system. CL 9567. As shown, at least two of the fans are arranged in an array. At CL 9576, four fans are shown for exhaust.
(e) said air-handling compartment associated with a structure such that the said air-handling system conditions the air of said structure; and	The Governair commercial devices are positioned to provide conditioning of the air in the air handling system.
(f) a control system for controlling the speed of the fan units in said plurality of fan units such that they run at substantially peak efficiency.	The Governair commercial devices include three supply fans provided with airfoil isolation dampers allowing the fans to be operated independently of each other. CL 9567. VFDs were provided to permit variable speed control; "the customer specified the use of Graham VFD controls on both the supply and exhaust fans, a detail which Governair was easily able to accommodate with its manufacturing flexibility." CL 9570-9571. Multiple fan arrays were provided with "independent VFD controls." CL 9572. The four exhaust fans are "staged" to control building pressure. CL 9576. While the specific control methodology of the structure is not described by the written references, While controlling the fan units to operate at "substantially peak efficiency" is not specifically shown, no written description, enabling disclosure or best mode of doing this is shown in the patents in suit. Investigation continues into the control of the Governair commercial devices.

EXHIBIT D

Claim Chart Comparison EP 0 004 448 to All Claims of Both Patents In Suit

Patents in Suit U.S. Patent No. 7,137,775 and U.S. Patent No. 7,179,046	**EP 0 004 448**
Claim Elements '775 Patent	
1. A fan array fan section in an air-handling system comprising:	EP 0 004 448 ("the Beard reference" or "Beard") discloses a heat exchanger to facilitate an air cooler to remove heat from a liquid used, successively, to cool a diesel engine. Page 2, lines 28-30; Figs. 1 and 2. A "matrix" of fans is disposed between two manifolds. Page 5, lines 9 through 11.
(a) at least six fan units;	Fig. 1 and 2 show four fans, and page 8, lines 11-13, indicate that as many as eight fans are suggested.
(b) said at least six fan units arranged in a fan array;	Four fans are arranged in a two-by-two array, Figs. 1 and 2; as many as eight fans are suggested. Page 8, lines 11-13.
(c) an air-handling compartment within which said fan array of fan units is positioned; and	Abstract; Fig. 2, Page 5, lines 8-21.
(d) an array controller for controlling said at least six fan units to run at substantially peak efficiency by strategically turning selective ones of said at least six fan units on and off,	The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Beard recognizes the desirability of not running to create cooling capacity in excess of the heat load to be dissipated. Page 4, line 18 to Page 5, line 3.
and wherein said array controller is programmed to operate said at least six fan	The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the

units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	"sequence control system is connected to the four [fan] motors."
2. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said at least six fan units are plenum fans.	Fig. 1 and 2 show four fans, and page 8, lines 11-13, indicate that as many as eight fans are suggested.
3. The fan array fan section in an air-handling system of 1,	*See* response to claim 1, set forth above.
wherein said air-handling compartment has an airway path, said airway path being less than 72 inches.	
4. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said at least six fan units are a plurality of fan units arranged in a fan array configuration selected from the group consisting of:	The two-by-two arrangement shown in Figs. 1 and 2 is a true array configuration.
(a) a true array configuration;	The two-by-two arrangement shown in Figs. 1 and 2 is a true array configuration.
(b) a spaced pattern array	

configuration;	
(c) a checker board array configuration;	
(d) rows slightly offset array configuration;	
(e) columns slightly offset array configuration; and	
(f) a staggered array configuration.	
5. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said at least six fan units include at least two vertically arranged fan units.	The two-by-two arrangement shown in Figs. 1 and 2 show at least two vertically arranged units.
6. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units is positioned within a fan unit chamber.	Fig. 2; Page 5 lines 9-15.
7. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units is suspended within a respective said fan unit chamber such that there is an air relief passage there	An air relief passage or fan bypass damper was commonly known as a device to reduce fan flow by bypassing air from the high to low side of the fan.

below.	
8. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units is positioned within a fan unit chamber having at least one acoustically absorptive insulation surface.	
9. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units are mounted in a grid system.	As shown, the two-by-two arrangement is mounted in a grid system. Fig. 1, Fig. 2.
10. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units has a fan wheel diameter, wherein spacing between said at least six fan units is less than 60% of said fan wheel diameter.	As shown, the two-by-two arrangement has fan units each spaced less than 60% of the fan wheel diameter apart from one another. Fig. 1, Fig. 2.
11. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
further comprising an array of	

backdraft dampeners, each backdraft dampener in line with a respective fan unit.	
12. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
said array controller is programmed to operate said at least six fan units at peak efficiency for a performance level based on a criteria selected from the following group of criteria:	The array controller is set to operate the fans in accordance with the number of fans desired to be operated. The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."
(a) air volume;	
(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to operate.	The array controller is set to operate the fans in accordance with the number of fans desired to be operated. The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."
13. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
said array controller is programmed to operate said at least six fan units to produce a stable operating point and eliminate the surge effects.	
14. The fan array fan	*See* response to claim 1, set forth above.

section in an air-handling system of claim 1,	
said array controller is programmed to selectively control the speed of each of said at least six fan units to run at substantially peak efficiency.	The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. Thus, "a waste of fan power is avoided." Page 4, lines 18 through 23. See also page 3, line 21 through page 4, line 2. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors." See also, Page 8, lines 25-27, expressly reciting the ability to also vary the speed of the individual fan units.
15. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
said air-handling compartment positionable within a structure such that said air-handling system conditions the air of said structure.	Abstract; Fig. 2, Page 5, lines 8-21.
16. A fan array fan section in an air-handling system comprising:	EP 0 004 448 ("the Beard reference" or "Beard") discloses a heat exchanger to facilitate an air cooler to remove heat from a liquid used, successively, to cool a diesel engine. Page 2, lines 28-30; Figs. 1 and 2. A "matrix" of fans is disposed between two manifolds. Page 5, lines 9 through 11.
(a) a plurality of independently controllable fan units, each fan unit comprising an inlet cone, a fan, and a motor;	
(b) said plurality of fan units arranged in a fan array;	Four fans are arranged in a two-by-two array, Figs. 1 and 2; as many as eight fans are suggested. Page 8, lines 11-13.
(c) an air-handling compartment within which said fan array of fan units is positioned;	Abstract; Fig. 2, Page 5, lines 8-21.

(d) an array controller for controlling said plurality of fan units to run at substantially peak efficiency by strategically turning selective ones of said plurality of fan units on and off; wherein	The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. Thus, "a waste of fan power is avoided." Page 4, lines 18 through 23.
(e) each of said plurality of fan units has a fan wheel diameter, wherein spacing between said pluality of fan units is less than 60% of said fan wheel diameter.	As shown, the two-by-two arrangement has fan units each spaced less than 60% of the fan wheel diameter apart from one another. Fig. 1, Fig. 2.
17. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said plurality of fan units are plenum fans.	Fig. 1 and 2 show four fans, and page 8, lines 11-13, indicate that as many as eight fans are suggested.
18. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said air-handling compartment has an airway path, said airway path being less than 72 inches.	
19. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said plurality of fan	The two-by-two arrangement shown in Figs. 1 and 2 is a true array configuration.

units are a plurality of fan units arranged in a fan array configuration selected from the group consisting of:	
(a) a true array configuration;	The two-by-two arrangement shown in Figs. 1 and 2 is a true array configuration.
(b) a spaced pattern array configuration;.	
(c) a checker board array configuration;	
(d) rows slightly offset array configuration;	
(e) columns slightly offset array configuration; and	
(f) a staggered array configuration.	
20. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said plurality of fan units include at least two vertically arranged fan units.	The two-by-two arrangement shown in Figs. 1 and 2 show at least two vertically arranged units.
21. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each of said plurality of fan units is positioned within a fan unit chamber.	Fig. 2; Page 5 lines 9-15.
22. The fan array fan section in an air-handling	*See* response to claim 16, set forth above.

system of claim 16,	
wherein each of said plurality of fan units is suspended within a respective said fan unit chamber such that there is an air relief passage therebelow.	An air relief passage or fan bypass damper was commonly known as a device to reduce fan flow by bypassing air from the high to low side of the fan.
23. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each of said plurality of fan units is positioned within a fan unit chamber having at least one acoustically absorptive insulation surface.	
24. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each of said plurality of fan units is mounted in a grid system.	As shown, the two-by-two arrangement is mounted in a grid system. Fig. 1, Fig. 2.
25. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
further comprising an array of backdraft dampeners,	
each backdraft dampener in line with a respective fan unit.	

26. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Beard recognizes the desirability of not running to create cooling capacity in excess of the heat load to be dissipated. Page 4, line 18 to Page 5, line 3.
wherein said array controller is programmed to operate said plurality of fan units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."
27. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said array controller is programmed to operate said plurality of fan units at peak efficiency for a performance level based on a criteria selected from the following group of criteria:	The array controller is set to operate the fans in accordance with the number of fans desired to be operated. The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."
(a) air volume	
(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to	The array controller is set to operate the fans in accordance with the number of fans desired to be

operate.	operated. The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."
28. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said array controller is programmed to operate said plurality of fan units to produce a stable operating point and eliminate the surge effects.	
29. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said array controller is programmed to selectively control the speed of each of said plurality of fan units to run at substantially peak efficiency.	The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. Thus, "a waste of fan power is avoided." Page 4, lines 18 through 23. See also page 3, line 21 through page 4, line 2. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors." See also, Page 8, lines 25-27, expressly reciting the ability to also vary the speed of the individual fan units.
30. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said air-handling compartment positionable within a structure such that said air-handling system conditions the air of said	Abstract; Fig. 2, Page 5, lines 8-21.

structure.	
Claim Elements '046 Patent	
1. A fan array fan section in an air-handling system comprising:	EP 0 004 448 ("the Beard reference" or "Beard") discloses a heat exchanger to facilitate an air cooler to remove heat from a liquid used, successively, to cool a diesel engine. Page 2, lines 28-30; Figs. 1 and 2. A "matrix" of fans is disposed between two manifolds. Page 5, lines 9 through 11.
(a) an air-handling compartment;	Abstract; Fig. 2, Page 5, lines 8-21.
(b) a plurality of fan units;	Fig. 1 and 2 show four fans, and page 8, lines 11-13, indicate that as many as eight fans are suggested.
(c) said plurality of fan units arranged in a fan array;	Four fans are arranged in a two-by-two array, Figs. 1 and 2; as many as eight fans are suggested. Page 8, lines 11-13.
(d) said fan array positioned within said air-handling compartment;	Abstract; Fig. 2, Page 5, lines 8-21.
(e) said air-handling compartment associated with a structure such that said air-handling system conditions the air of said structure; and	Abstract; Fig. 2, Page 5, lines 8-21.
(f) a control system for operating said plurality of fan units at substantially peak efficiency by strategically turning on and off selective ones of said plurality of fan units.	The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."
2. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said control system	The fans are controlled by a "settable sequence control system connected to said motors to bring

comprises a programmable array controller.	them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."
3. The fan array fan section in an air-handling system of claim 2,	*See* response to claim 2, set forth above.
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Beard recognizes the desirability of not running to create cooling capacity in excess of the heat load to be dissipated. Page 4, line 18 to Page 5, line 3.
wherein said array controller is programmed to operate said plurality of fan units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."
4. The fan array fan section in an air-handling system of claim 2,	*See* response to claim 2, set forth above.
where said array controller is programmed to operate said plurality of fan units at peak efficiency for a performance level based on a criterion selected from the following group of criteria:	The array controller is set to operate the fans in accordance with the number of fans desired to be operated. The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."

(a) air volume;	
(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to operate.	The array controller is set to operate the fans in accordance with the number of fans desired to be operated. The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."
5. The fan array fan section in an air-handling system of claim 2,	*See* response to claim 2, set forth above.
wherein said array controller is programmed to operate said plurality of fan units to produce a stable operating point and eliminate the surge effects.	
6. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said plurality of fan units are plenum fans.	
7. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said air-handling compartment has an airway path, said airway path being less than 72 inches.	

8. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said plurality of fan units are arranged in a fan array configuration selected from the group consisting of:	The two-by-two arrangement shown in Figs. 1 and 2 is a true array configuration.
(a) a true array configuration;	The two-by-two arrangement shown in Figs. 1 and 2 is a true array configuration.
(b) a spaced pattern array configuration;	
(c) a checker board array configuration;	
(d) rows slightly offset array configuration;	
(e) columns slightly offset array configuration; and	
(f) a staggered array configuration.	
9. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units is positioned within a fan unit chamber.	Fig. 2; Page 5 lines 9-15.
10. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units is suspended	An air relief passage or fan bypass damper was commonly known as a device to reduce fan flow by bypassing air from the high to low side of the fan.

within a respective said fan unit chamber such that there is an air relief passage therebelow.	
11. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units is positioned within a fan unit chamber having at least one acoustically absorptive insulation surface.	
12. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units is mounted in a grid system.	As shown, the two-by-two arrangement is mounted in a grid system. Fig. 1, Fig. 2.
13. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units has a fan wheel diameter, wherein spacing between said plurality of fan units is less than 60% of said fan wheel diameter.	As shown, the two-by-two arrangement has fan units each spaced less than 60% of the fan wheel diameter apart from one another. Fig. 1, Fig. 2.
14. The fan array fan	*See* response to claim 1, set forth above.

section in an air-handling system of claim 1,	
further comprising an array of backdraft dampeners,	
each backdraft dampener in line with a respective fan unit.	
15. A fan array fan section in an air-handling system comprising:	EP 0 004 448 ("the Beard reference" or "Beard") discloses a heat exchanger to facilitate an air cooler to remove heat from a liquid used, successively, to cool a diesel engine. Page 2, lines 28-30; Figs. 1 and 2. A "matrix" of fans is disposed between two manifolds. Page 5, lines 9 through 11.
(a) an air-handling compartment;	Abstract; Fig. 2, Page 5, lines 8-21.
(b) a plurality of fan units;	Fig. 1 and 2 show four fans, and page 8, lines 11-13, indicate that as many as eight fans are suggested.
(c) said plurality of fan units arranged in a fan array;	Four fans are arranged in a two-by-two array, Figs. 1 and 2; as many as eight fans are suggested. Page 8, lines 11-13.
(d) said fan array positioned within said air-handling compartment;	Abstract; Fig. 2, Page 5, lines 8-21.
(e) said air-handling compartment association with a structure such that the said air-handling system conditions the air of said structure; and	Abstract; Fig. 2, Page 5, lines 8-21.
(f) a control system for controlling said plurality of fan units,	The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. Thus, "a waste of fan power is avoided." Page 4, lines 18 through 23. See also page 3, line 21 through page 4, line 2. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors." See also, Page 8, lines 25-27, expressly reciting the ability to also vary the speed of the individual fan units.
said control system allowing control of the speed of the fan	The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. Thus, "a waste of fan power is

units in said plurality of fan units such that they run at substantially peak efficiency.	avoided." Page 4, lines 18 through 23. See also page 3, line 21 through page 4, line 2. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors." See also, Page 8, lines 25-27, expressly reciting the ability to also vary the speed of the individual fan units.
16. The fan array section in an air-bundling system of claim 15	*See* response to claim 15, set forth above.
wherein said control system comprises a programmable array controller.	The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."
17. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Beard recognizes the desirability of not running to create cooling capacity in excess of the heat load to be dissipated. Page 4, line 18 to Page 5, line 3.
wherein said array controller is programmed to operate said plurality of fan units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."
18. The fan array fan	*See* response to claim 16, set forth above.

section in an air-handling system of claim 16,	
wherein said array controller is programmed to operate said plurality of fan units at peak efficiency for a performance level based on a criterion selected from the following group of criteria:	The array controller is set to operate the fans in accordance with the number of fans desired to be operated. The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."
(a) air volume;	
(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to operate.	The array controller is set to operate the fans in accordance with the number of fans desired to be operated. The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. See also page 3, line 21 through page 4, line 2, page 4, line 18 to Page 5, line 3. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors."
19. A fan array fan section in an air-handling system comprising:	EP 0 004 448 ("the Beard reference" or "Beard") discloses a heat exchanger to facilitate an air cooler to remove heat from a liquid used, successively, to cool a diesel engine. Page 2, lines 28-30; Figs. 1 and 2. A "matrix" of fans is disposed between two manifolds. Page 5, lines 9 through 11.
(a) an air-handling compartment;	Abstract; Fig. 2, Page 5, lines 8-21.
(b) a plurality of independently controllable fan units;	Fig. 1 and 2 show four fans, and page 8, lines 11-13, indicate that as many as eight fans are suggested.
(c) said plurality of fan units arranged in a fan array;	Four fans are arranged in a two-by-two array, Figs. 1 and 2; as many as eight fans are suggested. Page 8, lines 11-13.
(d) said fan array positioned within said air-handling compartment;	Abstract; Fig. 2, Page 5, lines 8-21.
(e) said air-handling compartment associated with	Abstract; Fig. 2, Page 5, lines 8-21.

a structure such that the said air-handling system conditions the air of said structure; and	
(f) a control system for controlling the speed of the fan units in said plurality of fan units such that they run at substantially peak efficiency.	The fans are controlled by a "settable sequence control system connected to said motors to bring them automatically into operation successively." Page 3, lines 9-11. Thus, "a waste of fan power is avoided." Page 4, lines 18 through 23. See also page 3, line 21 through page 4, line 2. As shown at page 6, lines 17 through 24, the "sequence control system is connected to the four [fan] motors." See also, Page 8, lines 25-27, expressly reciting the ability to also vary the speed of the individual fan units.

EXHIBIT E

Claim Chart Comparison U.S. Patent No. 6,481,635 to All Claims of Both Patents In Suit

Patents in Suit U.S. Patent No. 7,137,775 and U.S. Patent No. 7,179,046	**U.S. Patent No. 6,481,635**
Claim Elements '775 Patent	
1. A fan array fan section in an air-handling system comprising:	The Riley apparatus 24 is positioned in an air handling unit 20. Col. 4, lines 14 through 16; Fig. 1. Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(a) at least six fan units;	Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(b) said at least six fan units arranged in a fan array;	The specific arrangement of the array suggested by Riley's express teaching of the use of multiple fans is not provided. Col. 3, lines 24 through 25.
(c) an air-handling compartment within which said fan array of fan units is positioned; and	The Riley apparatus 24 is positioned in an air handling unit 20. Col. 4, lines 14 through 16; Fig. 1. Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(d) an array controller for controlling said at least six fan units to run at substantially peak efficiency by strategically turning selective ones of said at least six fan units on and off,	"Through proper programing [sic] of either the control unit 72, the VFD's 36 and 38, or both, maximum speed settings may be established for the fans 24 and 32. Likewise, minimum speed settings may be established for the fans 24 and 32." Col. 5, lines 60-63. While not specifically recited, by furnishing independent speed control of multiple fans through VFDs and associating damper assemblies with the fan units (Col. 4, lines 32 through 39), and further by recognizing that fan units have inherent minimum and maximum efficient operating speeds, Col. 5, lines 60-63, on-off control is facilitated.
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Riley recognizes and accommodates that fan units have inherent minimum and maximum efficient operating speeds, Col. 5, lines 60-63.
and wherein said array controller is programmed to operate said at least six fan units at substantially peak	While not specifically recited, by furnishing independent speed control of multiple fans through VFDs and associating damper assemblies with the fan units (Col. 4, lines 32 through 39), and further by recognizing that fan units have inherent minimum and maximum efficient operating speeds, Col. 5, lines 60-63, on-off control is facilitated.

efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	
2. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said at least six fan units are plenum fans.	The fans are shown schematically.
3. The fan array fan section in an air-handling system of 1,	*See* response to claim 1, set forth above.
wherein said air-handling compartment has an airway path, said airway path being less than 72 inches.	
4. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said at least six fan units are a plurality of fan units arranged in a fan array configuration selected from the group consisting of:	The specific arrangement of the array suggested by Riley's express teaching of the use of multiple fans is not provided. Col. 3, lines 24 through 25.
(a) a true array configuration;	
(b) a spaced pattern array configuration;	

(c) a checker board array configuration;	
(d) rows slightly offset array configuration;	
(e) columns slightly offset array configuration; and	
(f) a staggered array configuration.	
5. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said at least six fan units include at least two vertically arranged fan units.	The specific arrangement of the array suggested by Riley's express teaching of the use of multiple fans is not provided. Col. 3, lines 24 through 25.
6. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units is positioned within a fan unit chamber.	Riley's express teaching of the use of multiple fans suggest that they be located together, as an alternative to use of the single fan shown in Fig. 1. Col. 3, lines 24 through 25.
7. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units is suspended within a respective said fan unit chamber such that there is an air relief passage there below.	An air relief passage or fan bypass damper was commonly known as a device to reduce fan flow by bypassing air from the high to low side of the fan.

8. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units is positioned within a fan unit chamber having at least one acoustically absorptive insulation surface.	
9. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units are mounted in a grid system.	
10. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said at least six fan units has a fan wheel diameter, wherein spacing between said at least six fan units is less than 60% of said fan wheel diameter.	
11. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
further comprising an array of backdraft dampeners, each	Riley discloses the use of louvers or adjustable vents 42 which, as shown in Fig. 1, are in line with the fan unit 24. Col. 4, lines 38 through 40.

backdraft dampener in line with a respective fan unit.	
12. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
said array controller is programmed to operate said at least six fan units at peak efficiency for a performance level based on a criteria selected from the following group of criteria:	The controller provided in Riley is constructed to monitor a parameter indicative of the internal environment of the building, Col. 2, lines 56 through 60, and the speed of the fans is altered accordingly. Id. "The same method can be employed to effect changes in airflow rate [volume]… ." Col. 3, lines 2 through 4.
(a) air volume;	The controller provided in Riley is constructed to monitor a parameter indicative of the internal environment of the building, Col. 2, lines 56 through 60, and the speed of the fans is altered accordingly. Id. "The same method can be employed to effect changes in airflow rate [volume]… ." Col. 3, lines 2 through 4.
(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to operate.	
13. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
said array controller is programmed to operate said at least six fan units to produce a stable operating point and eliminate the surge effects.	The VFDs in riley are programmable, and minimum speed settings can be programmed in, Col. 5, lines 60 through 65. This is a known method of preventing operation of fans in a range that creates surge.
14. The fan array fan section in an air-handling	*See* response to claim 1, set forth above.

system of claim 1,	
said array controller is programmed to selectively control the speed of each of said at least six fan units to run at substantially peak efficiency.	"Through proper programing [sic] of either the control unit 72, the VFD's 36 and 38, or both, maximum speed settings may be established for the fans 24 and 32. Likewise, minimum speed settings may be established for the fans 24 and 32." Col. 5, lines 60-63. See generally Cols. 5 through 7.
15. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
said air-handling compartment positionable within a structure such that said air-handling system conditions the air of said structure.	The air handling compartment is positioned within and associated with structure so that the system conditions the air of the structure. Fig. 1, see also Col. 4, lines 14 through 16.
16. A fan array fan section in an air-handling system comprising:	The Riley apparatus 24 is positioned in an air handling unit 20. Col. 4, lines 14 through 16; Fig. 1. Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(a) a plurality of independently controllable fan units, each fan unit comprising an inlet cone, a fan, and a motor;	The specific arrangement of the controls, and the interrelation of the VFDs and the fans, as suggested by Riley's express teaching of the use of multiple fans is not provided. Col. 3, lines 24 through 25.
(b) said plurality of fan units arranged in a fan array;	The specific arrangement of the array suggested by Riley's express teaching of the use of multiple fans is not provided. Col. 3, lines 24 through 25.
(c) an air-handling compartment within which said fan array of fan units is positioned;	The Riley apparatus 24 is positioned in an air handling unit 20. Col. 4, lines 14 through 16; Fig. 1. Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(d) an array controller for	"Through proper programing [sic] of either the control unit 72, the VFD's 36 and 38, or both,

controlling said plurality of fan units to run at substantially peak efficiency by strategically turning selective ones of said plurality of fan units on and off; wherein	maximum speed settings may be established for the fans 24 and 32. Likewise, minimum speed settings may be established for the fans 24 and 32." Col. 5, lines 60-63.
(e) each of said plurality of fan units has a fan wheel diameter, wherein spacing between said pluality of fan units is less than 60% of said fan wheel diameter.	
17. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said plurality of fan units are plenum fans.	The fans are shown schematically.
18. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said air-handling compartment has an airway path, said airway path being less than 72 inches.	
19. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said plurality of fan units are a plurality of fan	The specific arrangement of the array suggested by Riley's express teaching of the use of multiple fans is not provided. Col. 3, lines 24 through 25.

units arranged in a fan array configuration selected from the group consisting of:	
(a) a true array configuration;	
(b) a spaced pattern array configuration;.	
(c) a checker board array configuration;	
(d) rows slightly offset array configuration;	
(e) columns slightly offset array configuration; and	
(f) a staggered array configuration.	
20. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said plurality of fan units include at least two vertically arranged fan units.	The specific arrangement of the array suggested by Riley's express teaching of the use of multiple fans is not provided. Col. 3, lines 24 through 25.
21. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each of said plurality of fan units is positioned within a fan unit chamber.	Riley's express teaching of the use of multiple fans suggest that they be located together, as an alternative to use of the single fan shown in Fig. 1. Col. 3, lines 24 through 25.
22. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.

wherein each of said plurality of fan units is suspended within a respective said fan unit chamber such that there is an air relief passage therebelow.	An air relief passage or fan bypass damper was commonly known as a device to reduce fan flow by bypassing air from the high to low side of the fan.
23. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each of said plurality of fan units is positioned within a fan unit chamber having at least one acoustically absorptive insulation surface.	
24. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each of said plurality of fan units is mounted in a grid system.	
25. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
further comprising an array of backdraft dampeners, each backdraft dampener in line with a respective fan unit.	Riley discloses the use of louvers or adjustable vents 42 which, as shown in Fig. 1, are in line with the fan unit 24. Col. 4, lines 38 through 40.

26. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Riley recognizes and accommodates that fan units have inherent minimum and maximum efficient operating speeds, Col. 5, lines 60-63.
wherein said array controller is programmed to operate said plurality of fan units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	While not specifically recited, by furnishing independent speed control of multiple fans through VFDs and associating damper assemblies with the fan units (Col. 4, lines 32 through 39), and further by recognizing that fan units have inherent minimum and maximum efficient operating speeds, Col. 5, lines 60-63, on-off control is facilitated.
27. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said array controller is programmed to operate said plurality of fan units at peak efficiency for a performance level based on a criteria selected from the following group of criteria:	The controller provided in Riley is constructed to monitor a parameter indicative of the internal environment of the building, Col. 2, lines 56 through 60, and the speed of the fans is altered accordingly. Id. "The same method can be employed to effect changes in airflow rate [volume]… ." Col. 3, lines 2 through 4.
(a) air volume	The controller provided in Riley is constructed to monitor a parameter indicative of the internal environment of the building, Col. 2, lines 56 through 60, and the speed of the fans is altered accordingly. Id. "The same method can be employed to effect changes in airflow rate [volume]… ." Col. 3, lines 2 through 4.

(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to operate.	
28. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said array controller is programmed to operate said plurality of fan units to produce a stable operating point and eliminate the surge effects.	The VFDs in riley are programmable, and minimum speed settings can be programmed in, Col. 5, lines 60 through 65. This is a known method of preventing operation of fans in a range that creates surge.
29. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said array controller is programmed to selectively control the speed of each of said plurality of fan units to run at substantially peak efficiency.	"Through proper programing [sic] of either the control unit 72, the VFD's 36 and 38, or both, maximum speed settings may be established for the fans 24 and 32. Likewise, minimum speed settings may be established for the fans 24 and 32." Col. 5, lines 60-63. See generally Cols. 5 through 7.
30. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
said air-handling compartment positionable within a structure such that said air-handling system conditions the air of said	The air handling compartment is positioned within and associated with structure so that the system conditions the air of the structure. Fig. 1, see also Col. 4, lines 14 through 16.

structure.	
Claim Elements '046 Patent	
1. A fan array fan section in an air-handling system comprising:	The Riley apparatus 24 is positioned in an air handling unit 20. Col. 4, lines 14 through 16; Fig. 1. Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(a) an air-handling compartment;	The Riley apparatus 24 is positioned in an air handling unit 20. Col. 4, lines 14 through 16; Fig. 1. Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(b) a plurality of fan units;	Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(c) said plurality of fan units arranged in a fan array;	The specific arrangement of the array suggested by Riley's express teaching of the use of multiple fans is not provided. Col. 3, lines 24 through 25.
(d) said fan array positioned within said air-handling compartment;	The Riley apparatus 24 is positioned in an air handling unit 20. Col. 4, lines 14 through 16; Fig. 1. Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(e) said air-handling compartment associated with a structure such that said air-handling system conditions the air of said structure; and	The air handling compartment is positioned within and associated with structure so that the system conditions the air of the structure. Fig. 1, see also Col. 4, lines 14 through 16.
(f) a control system for operating said plurality of fan units at substantially peak efficiency by strategically turning on and off selective ones of said plurality of fan units.	While not specifically recited, by furnishing independent speed control of multiple fans through VFDs and associating damper assemblies with the fan units (Col. 4, lines 32 through 39), and further by recognizing that fan units have inherent minimum and maximum efficient operating speeds, Col. 5, lines 60-63, on-off control is facilitated.
2. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said control system comprises a programmable	While not specifically recited, by furnishing independent speed control of multiple fans through VFDs and associating damper assemblies with the fan units (Col. 4, lines 32 through 39), and further

array controller.	by recognizing that fan units have inherent minimum and maximum efficient operating speeds, Col. 5, lines 60-63, on-off control is facilitated.
3. The fan array fan section in an air-handling system of claim 2,	*See* response to claim 2, set forth above.
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Riley recognizes and accommodates that fan units have inherent minimum and maximum efficient operating speeds, Col. 5, lines 60-63.
wherein said array controller is programmed to operate said plurality of fan units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	While not specifically recited, by furnishing independent speed control of multiple fans through VFDs and associating damper assemblies with the fan units (Col. 4, lines 32 through 39), and further by recognizing that fan units have inherent minimum and maximum efficient operating speeds, Col. 5, lines 60-63, on-off control is facilitated.
4. The fan array fan section in an air-handling system of claim 2,	*See* response to claim 2, set forth above.
where said array controller is programmed to operate said plurality of fan units at peak efficiency for a performance level based on a criterion selected from the following group of criteria:	The controller provided in Riley is constructed to monitor a parameter indicative of the internal environment of the building, Col. 2, lines 56 through 60, and the speed of the fans is altered accordingly. Id. "The same method can be employed to effect changes in airflow rate [volume]… ." Col. 3, lines 2 through 4.
(a) air volume;	The controller provided in Riley is constructed to monitor a parameter indicative of the internal

	environment of the building, Col. 2, lines 56 through 60, and the speed of the fans is altered accordingly. Id. "The same method can be employed to effect changes in airflow rate [volume]… ." Col. 3, lines 2 through 4.
(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to operate.	
5. The fan array fan section in an air-handling system of claim 2,	*See* response to claim 2, set forth above.
wherein said array controller is programmed to operate said plurality of fan units to produce a stable operating point and eliminate the surge effects.	The VFDs in riley are programmable, and minimum speed settings can be programmed in, Col. 5, lines 60 through 65. This is a known method of preventing operation of fans in a range that creates surge.
6. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said plurality of fan units are plenum fans.	The fans are shown schematically.
7. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said air-handling compartment has an airway path, said airway path being less than 72 inches.	

8. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein said plurality of fan units are arranged in a fan array configuration selected from the group consisting of:	The specific arrangement of the array suggested by Riley's express teaching of the use of multiple fans is not provided. Col. 3, lines 24 through 25.
(a) a true array configuration;	
(b) a spaced pattern array configuration;	
(c) a checker board array configuration;	
(d) rows slightly offset array configuration;	
(e) columns slightly offset array configuration; and	
(f) a staggered array configuration.	
9. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units is positioned within a fan unit chamber.	Riley's express teaching of the use of multiple fans suggest that they be located together, as an alternative to use of the single fan shown in Fig. 1. Col. 3, lines 24 through 25.
10. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units is suspended within a respective said fan	An air relief passage or fan bypass damper was commonly known as a device to reduce fan flow by bypassing air from the high to low side of the fan.

unit chamber such that there is an air relief passage therebelow.	
11. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units is positioned within a fan unit chamber having at least one acoustically absorptive insulation surface.	
12. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units is mounted in a grid system.	
13. The fan array fan section in an air-handling system of claim 1,	*See* response to claim 1, set forth above.
wherein each of said plurality of fan units has a fan wheel diameter, wherein spacing between said plurality of fan units is less than 60% of said fan wheel diameter.	
14. The fan array fan section in an air-handling	*See* response to claim 1, set forth above.

system of claim 1,	
further comprising an array of backdraft dampeners, each backdraft dampener in line with a respective fan unit.	Riley discloses the use of louvers or adjustable vents 42 which, as shown in Fig. 1, are in line with the fan unit 24. Col. 4, lines 38 through 40.
15. A fan array fan section in an air-handling system comprising:	The Riley apparatus 24 is positioned in an air handling unit 20. Col. 4, lines 14 through 16; Fig. 1. Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(a) an air-handling compartment;	The Riley apparatus 24 is positioned in an air handling unit 20. Col. 4, lines 14 through 16; Fig. 1. Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(b) a plurality of fan units;	Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(c) said plurality of fan units arranged in a fan array;	The specific arrangement of the array suggested by Riley's express teaching of the use of multiple fans is not provided. Col. 3, lines 24 through 25.
(d) said fan array positioned within said air-handling compartment;	The Riley apparatus 24 is positioned in an air handling unit 20. Col. 4, lines 14 through 16; Fig. 1. Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(e) said air-handling compartment association with a structure such that the said air-handling system conditions the air of said structure; and	The air handling compartment is positioned within and associated with structure so that the system conditions the air of the structure. Fig. 1, see also Col. 4, lines 14 through 16.
(f) a control system for controlling said plurality of fan units,	"Through proper programing [sic] of either the control unit 72, the VFD's 36 and 38, or both, maximum speed settings may be established for the fans 24 and 32. Likewise, minimum speed settings may be established for the fans 24 and 32." Col. 5, lines 60-63. See generally Cols. 5 through 7.
said control system allowing control of the speed of the fan units in said plurality of fan units such that they run at substantially peak efficiency.	"Through proper programing [sic] of either the control unit 72, the VFD's 36 and 38, or both, maximum speed settings may be established for the fans 24 and 32. Likewise, minimum speed settings may be established for the fans 24 and 32." Col. 5, lines 60-63. See generally Cols. 5 through 7.

16. The fan array section in an air-bundling system of claim 15	*See* response to claim 15, set forth above.
wherein said control system comprises a programmable array controller.	While not specifically recited, by furnishing independent speed control of multiple fans through VFDs and associating damper assemblies with the fan units (Col. 4, lines 32 through 39), and further by recognizing that fan units have inherent minimum and maximum efficient operating speeds, Col. 5, lines 60-63, on-off control is facilitated.
17. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein each fan unit has a peak efficiency operating range outside of which it operates at a reduced efficiency,	Riley recognizes and accommodates that fan units have inherent minimum and maximum efficient operating speeds, Col. 5, lines 60-63.
wherein said array controller is programmed to operate said plurality of fan units at substantially peak efficiency by strategically turning off at least one fan unit operating at reduced efficiency and running the remaining fan units within said peak efficiency operating range.	While not specifically recited, by furnishing independent speed control of multiple fans through VFDs and associating damper assemblies with the fan units (Col. 4, lines 32 through 39), and further by recognizing that fan units have inherent minimum and maximum efficient operating speeds, Col. 5, lines 60-63, on-off control is facilitated.
18. The fan array fan section in an air-handling system of claim 16,	*See* response to claim 16, set forth above.
wherein said array controller is programmed to operate said	The controller provided in Riley is constructed to monitor a parameter indicative of the internal environment of the building, Col. 2, lines 56 through 60, and the speed of the fans is altered

plurality of fan units at peak efficiency for a performance level based on a criterion selected from the following group of criteria:	accordingly. Id. "The same method can be employed to effect changes in airflow rate [volume]… ." Col. 3, lines 2 through 4.
(a) air volume;	The controller provided in Riley is constructed to monitor a parameter indicative of the internal environment of the building, Col. 2, lines 56 through 60, and the speed of the fans is altered accordingly. Id. "The same method can be employed to effect changes in airflow rate [volume]… ." Col. 3, lines 2 through 4.
(b) level of air flow;	
(c) pattern of air flow; and	
(d) number of fan units to operate.	
19. A fan array fan section in an air-handling system comprising:	The Riley apparatus 24 is positioned in an air handling unit 20. Col. 4, lines 14 through 16; Fig. 1. Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(a) an air-handling compartment;	The Riley apparatus 24 is positioned in an air handling unit 20. Col. 4, lines 14 through 16; Fig. 1. Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(b) a plurality of independently controllable fan units;	Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(c) said plurality of fan units arranged in a fan array;	The specific arrangement of the array suggested by Riley's express teaching of the use of multiple fans is not provided. Col. 3, lines 24 through 25.
(d) said fan array positioned within said air-handling compartment;	The Riley apparatus 24 is positioned in an air handling unit 20. Col. 4, lines 14 through 16; Fig. 1. Riley expressly teaches the use of multiple fans. Col. 3, lines 24 through 25.
(e) said air-handling compartment associated with a structure such that the said air-handling system conditions the air of said structure; and	The air handling compartment is positioned within and associated with structure so that the system conditions the air of the structure. Fig. 1, see also Col. 4, lines 14 through 16.

(f) a control system for controlling the speed of the fan units in said plurality of fan units such that they run at substantially peak efficiency.	"Through proper programing [sic] of either the control unit 72, the VFD's 36 and 38, or both, maximum speed settings may be established for the fans 24 and 32. Likewise, minimum speed settings may be established for the fans 24 and 32." Col. 5, lines 60-63. See generally Cols. 5 through 7.

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and correct copy of the foregoing **CLIMATECRAFT, INC.'S INITIAL INVALIDITY CONTENTIONS** was served upon:

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via electronic transmission (e-mail), this 7th day of May, 2008.

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EXHIBIT N

NEWS RELEASE

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Huntair® and CleanPak™ Join CES Group™

Chaska, MN (April 18, 2006) – Nortek, Inc. ("Nortek"), a leading international designer, manufacturer and marketer of high-quality branded products for ventilation, HVAC and residential comfort, convenience and entertainment, today announced that, through its wholly-owned subsidiaries, it has acquired the assets of Huntair, Inc. ("Huntair"), a leader in creating cleanroom environments for the semiconductor, healthcare and pharmaceutical industries as well as for comfort applications, and CleanPak International, LLC ("CleanPak"), a company specializing in cleanroom applications.

Huntair and CleanPak were privately held companies located in Tualatin and Clackamas, Oregon, respectively. Huntair and CleanPak will become subsidiaries of the CES Group, Inc. ("CES Group"), a wholly-owned subsidiary of Nortek, joining the existing family of companies affiliated with the CES Group that provide custom-engineered air conditioning solutions sold under such leading brands as Governair®, Mammoth®, Temtrol®, Venmar CES™, Ventrol®, WEBCO™ and Eaton-Williams®.

CleanPak founded in 1985, and Huntair founded in 1993, are the leaders in the design, manufacturing and marketing of customized integrated airflow management solutions. Huntair was named a "1999 Technology Fast 500 Winner" by Forbes magazine, and has been named one of the 50 Fastest Growing Private Companies in Oregon by the Business Journal. Both company's products range from specialized HVAC applications used in critical industrial environments such as biotechnology and pharmaceuticals manufacturing, aerospace and hospitals, to the extremely demanding cleanrooms used in semiconductor manufacturing. Their products are also used in a wide variety of other demanding settings including large commercial buildings, shopping centers, sports arenas, universities, municipal buildings and airports.

Both companies are committed to development of industry leading products that provide a wide range of benefits. One of which is Huntair's new patented Fan Wall Technology (FWT). FWT is one of the most significant advances in air handler technology in years. Based on replacing large fans with a modular array of smaller fans, FWT allows major improvements in footprint, reliability, energy efficiency, sound attenuation and operating costs.

"This acquisition broadens our range of custom-engineered air-handling designs and technologies," said CES Group, Inc. President David J. Huntley. "It provides a base for some exciting technologies that will enable us to better serve our customers with more compact, quieter and more energy efficient air conditioning solutions."

Dave Benson, Huntair's founder and CEO, said "Joining the Nortek and CES Group family of companies will greatly enhance the opportunities for both Huntair and CleanPak to serve their clients all over the globe and speed the market adoption of our new Fan Wall Technology."

The companies that comprise CES Group are some of the world's leading custom-engineered air conditioning manufacturers, offering a full range of products, from 1/2 to 2,000+ tons and 300 to 400,000+ cfm. The CES Group can provide innovative, cost-effective, custom-engineered solutions for today's most challenging HVAC applications.

For more information, visit the CES Group's web site at: www.ces-group.com.